Project Manual For:

Pottsgrove School District

Pottsgrove High School

Facility & Athletic Improvement

Work Scope 1 General Construction

Work Scope 2 Electrical Construction

Work Scope 3 Mechanical Construction

Work Scope 4 Plumbing Construction

1301 Kauffman Road

Pottstown, PA 19464

Issue Date: October 21, 2026

CMTA | ICS

A LEGENCE Company

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SECTION 00 00 10 – PROJECT MANUAL TITLE PAGE

OWNER:	**Pottsgrove School District** 1301 Kauffman Road Pottstown, PA 19464
PROJECT LOCATION:	**Pottsgrove High School** 1301 Kauffman Road Pottstown, PA 19464
CONSTRUCTION MANAGER:	**CMTA, Inc.** 1400 N. Providence Rd., Building 2, Suite 4045, Media, PA 19063 Phone: 610-424-4172 Project Manager: Scott Kennedy Email: scott.kennedy@cmta.com Direct: 267-718-0148
CIVIL ENGINEER:	**K&W Engineers** 2201 North Front St., Suite 200, Harrisburg, PA 17110 Phone: 717-635-2835 X1019 Contact: Carolyn DuBois Email: cdubois@kandwengineers.com
MECHANICAL ENGINEER:	**CMTA, Inc.** 220 Lexington Green Circle, Lexington, KY 40503 Phone: 859-253-0892 Contact: Austin Hutchison Email: AHutchison@cmta.com
ELECTRICAL ENGINEER:	**CMTA, Inc.** 1400 N. Providence Rd, Suite 4045, Media, PA 19063 Phone: 610-663-2135 Contact: Tod Ross Email: Tod.Ross@cmta.com
ARCHITECT:	**GKO Architects** 300 Brookside Ave. Bldg. 18, Suite 150, Ambler, PA 19002 Phone: 215-646-2003 Contact: Kevin Godshall Email: kevin@gkoarchitects.com

END OF SECTION 00 00 10

SECTION 00 01 00 – TABLE OF CONTENTS (Public Bid Package)

TABLE OF CONTENTS

Copyright

PROJECT DRAWING INDEX
As Listed on Contract Drawings Cover Sheet

PROJECT MANUAL INDEX
00 00 00 Manual Cover
00 00 10 Project Manual Title Page
00 01 00 Table of Contents

DIVISION 00 – PROCUREMENT & CONTRACTING REQUIREMENTS
00 11 13 Advertisement for Bids
00 11 53 Contractor Qualification Statement, AIA Document A305-2020 and Exhibits A-D
00 21 13 Instructions to Bidders – AIA Document A701
00 21 14 Pennsylvania School Districts OCIP Insurance Manual
00 21 15 OCIP Costs Worksheets
00 22 20 Background Checks and Other Verifications
00 22 21 Act 141: Public Works Employment Verification Form
00 22 22 Act 151: Child Abuse Clearance Form
00 22 23 Act 34: Pennsylvania State Police Clearance Form
00 22 24 Act 24/Act 82: PDE Form 6004
00 22 25 Act 168: PA Sexual Misconduct-Abuse Disclosure Release
00 31 32 Geotechnical Data
00 31 33 David Blackmore Geotechnical Engineering Report dated May 14, 2026
00 31 34 K&W Engineering Infiltration Testing Plan and Logs dated May 26, 2026
00 41 16 Bid Form – Work Scope No. 1 – General Construction
00 41 17 Bid Form – Work Scope No. 2 – Electrical Construction
00 41 18 Bid Form – Work Scope No. 3 – Mechanical Construction
00 41 19 Bid Form – Work Scope No.4 – Plumbing Construction
00 43 13 Bid Bond Form, AIA Document A310-2010
00 43 15 Agreement of Surety
00 43 25 Substitution Form
00 43 93 Bid Submittal Attachments
00 45 19 Non-Collusion Affidavit
00 50 00 List of Contract Forms
00 52 13 Standard Form of Agreement between Owner & Contractor (AIA Document A132)
00 61 13 Performance and Payment Bonds
00 61 14 Performance Bond
00 61 15 Payment Bond
00 72 00 General Conditions of the Contract for Construction (AIA Document A232)
00 73 19 Safety
00 73 43 Prevailing Wage Rate Requirements
00 73 44 Certified Payroll Sample Form – PA Dept of Labor & Industry Form LLC-25
00 73 46 Prevailing Wage Rate Determination Schedule
00 91 00 Addenda

DIVISION 01 – GENERAL REQUIREMENTS
01 11 00 Summary of Work
01 12 00 Multiple Work Scope Summary
01 22 00 Unit Prices and Material Allowances
01 23 00 Alternates
01 26 00 Contract Modification Procedures
01 29 00 Payment Procedures
01 31 00 Project Management and Coordination
01 31 17 Coordination Drawings
01 31 26 Electronic Communication Protocols
01 32 00 Construction Progress Documentation
01 33 00 Submittal Procedures
01 40 00 Quality Requirements
01 50 00 Temporary Facilities and Controls
01 60 00 Product Requirements
01 73 00 Execution
01 73 29 Cutting and Patching
01 77 00 Closeout Procedures

DIVISION 02 – EXISTING CONDITIONS
02 41 16 Structure Demolition

DIVISION 03 – CONCRETE
03 30 00 Cast-In-Place Concrete
03 30 02 Cast-In-Place Concrete for Utilities
03 54 16 Hydraulic Cement Underlayment

DIVISION 04 – MASONRY
04 20 00 Unit Masonry

DIVISION 05 – METALS
05 12 00 Structural Steel Framing
05 31 00 Steel Decking
05 40 00 Cold Formed Metal Framing
05 44 00 Cold Formed Metal Trusses
05 50 00 Metal Fabrications
05 52 13 Pipe and Tube Railing

DIVISION 06 – WOOD, PLASTICS, AND COMPOSITES
06 10 00 Rough Carpentry
06 16 00 Sheathing
06 41 16 Plastic Laminate Clad Architectural Cabinets and Countertops
06 64 00 Plastic Paneling

DIVISION 07 – THERMAL AND MOISTURE PROTECTION
07 11 13 Bituminous Damproofing
07 13 26 Self Adhering Sheet Waterproofing
07 21 00 Thermal Insulation
07 27 26 Fluid Applied Membrane Air Barriers
07 41 13.13 Formed Metal Roof Panels
07 42 13.13 Formed Metal Wall Panels

07 42 13.23 Metal Composite Wall Panels
07 53 23 Ethylene Propylene Diene Monomer Roofing (EPDM)
07 54 19 Polyvinyl Chloride Roofing (PVC)
07 62 00 Sheet Metal Flashing and Trim
07 71 00 Roof Specialties
07 72 00 Roof Accessories
07 84 13 Penetration Fire Stopping
07 84 43 Joint Fire Stopping
07 92 00 Joint Sealants

DIVISION 08 – OPENINGS
08 11 13 Hollow Metal Doors and Frames
08 14 16 Flush Wood Doors
08 16 13 Fiberglass Doors
08 31 13 Access Doors and Frames
08 33 13 Coiling Counter Doors
08 33 23 Overhead Coiling Doors
08 36 13 Sectional Doors
08 41 13 Aluminum Framed Entrances and Storefronts
08 71 00 Door Hardware
08 80 00 Glazing

DIVISION 09 – FINISHES
09 22 16 Non-Structural Metal Framing
09 29 00 Gypsum Board
09 30 13 Ceramic Tiling
09 51 13 Acoustical Panel Ceilings
09 65 13 Resilient Base and Accessories
09 65 19 Resilient Tile Flooring
09 68 13 Tile Carpeting
09 91 00 Painting

DIVISION 10 – SPECIALTIES
10 14 00 Signage
10 14 16 Plaques
10 21 13 Toilet Compartments
10 22 13 Wire Mesh Partitions
10 26 00 Wall and Door Protection
10 28 00 Toilet and Bath Accessories
10 44 00 Fire Protection Specialties
10 51 13 Metal Lockers
10 75 00 Flag Poles

DIVISION 11– EQUIPMENT
11 33 00 Retractable Ladder
11 40 00 Food Service Equipment

DIVISION 12– FURISHINGS

12 24 13 Roller Window Shades
12 36 16 Metal Countertops
12 36 61 Solid Surfacing Materials

DIVISION 20 - MECHANICAL
20 01 00 General Provisions - Mechanical
20 02 00 Scope of the Mechanical Work
20 03 00 Shop Drawings, Descriptive Literature, Maintenance Manuals, Parts Lists, Special Keys and Tools
20 04 00 Demolition and Salvage
20 05 00 Coordination Among Trades, Systems Interfacing and Connection of Equipment Furnished by Others
20 11 00 Sleeving, Cutting, Patching and Repairing
20 12 00 Excavation, Trenching, Backfilling and Grading
20 13 00 Pipe, Pipe Fittings, and Pipe Support
20 13 10 Welding
20 21 00 Valves and Cocks
20 21 10 Access to Valves, Equipment, Filters, Etc.
20 22 00 Insulation - Mechanical
20 23 00 Thermometers and Others, Monitoring Instruments
20 24 00 Identifications, Tags, Charts, Etc.
20 25 00 Hangers, Clamps, Attachments, Etc.
20 31 00 Testing, Balancing, Lubrication and Adjustments
20 32 00 Mechanical Maintenance

DIVISION 21 – FIRE SUPPRESSION
21 01 00 Fire Protection

DIVISION 22 – PLUMBING
22 01 00 Plumbing Specialties
22 02 00 Plumbing Fixtures, Fittings and Trim
22 03 00 Plumbing Equipment

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (HVAC)
23 01 30 HVAC Duct System Cleaning
23 02 00 HVAC Equipment
23 03 00 Condensation Drainage System (For Cooling Equipment)
23 11 00 Registers, Grilles, Diffuser and Louvers
23 12 00 Sheet Metal and Flexible Duct

DIVISION 25 – INTEGRATED AUTOMATION
25 01 00 Motor Starters and Other Electrical Requirements for Mechanical Equipment

DIVISION 26 – ELECTRICAL
26 05 01 General Provisions - Electrical
26 05 02 Scope of the Electrical Work
26 05 03 Shop Drawings, Literature, Manuals, Parts Lists, and Special Tools
26 05 04 Sleeving, Cutting, Patching and Repairing
26 05 05 Demolition, Restoration and Salvage
26 05 08 Coordination Among Trades, Systems Interfacing and Connection of Equipment Furnished by Others

26 05 19 Conductors, Identifications, Splicing Devices and Connectors
26 05 26 Grounding and Bonding
26 05 29 Hangers and Supports for Electrical Systems
26 05 31 Cabinets, Outlet Boxes and Pull Boxes
26 05 33 Raceways and Fittings
26 05 53 Identifications
26 24 00 Electrical Distribution Equipment
26 27 26 Wiring Devices and Plates
26 51 13 LED Lighting
26 56 68 Exterior Athletic Lighting

DIVISION 27 – COMMUNICATIONS
27 06 10 Voice Data System

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
28 31 00 Fire Alarm System

DIVISION 31 – EARTHWORK
31 10 00 Site Clearing
31 20 00 Earth Moving
31 23 14 Synthetic Turf Base Preparation
31 23 19 Dewatering
31 50 00 Excavation Support and Protection

DIVISION 32 – EXTERIOR IMPROVEMENTS
32 12 16 Asphalt Paving
32 13 13 Cement Concrete and Concrete Paving
32 13 73 Concrete Paving Joint Sealants
32 17 13 Parking Bumpers
32 17 23 Pavement Markings
32 17 26 Tactile Warning Surface
32 18 14 Synthetic Grass Turf System
32 18 33 Synthetic Track Surfacing
32 18 37 Track Line-Marking
32 31 13 Chain Link Fence and Gates
32 31 20 Ornamental Picket Fence and Gates
32 33 00 Misc. Site Improvements
32 91 13 Soil Preparation
32 92 00 Turf and Grass
32 93 00 Plants

DIVISION 33 – UTILITIES
33 11 13 Facility Water Distribution and Piping
33 13 13 Facility Sanitary Sewers
33 41 00 Storm Utility Drainage Piping
33 46 00 Subdrainage

END OF SECTION - 00 01 00

SECTION 00 11 13 – ADVERTISEMENT FOR BIDS

The Pottsgrove School District is soliciting sealed bids for Work Scope 1 through 4 for the Pottsgrove High School Facility & Athletic Improvement Project located in Lower Pottsgrove Township, Montgomery County, PA. Sealed Bids for all work scopes shall be delivered to Ron Linke, Business Administrator, no later than **3:00 pm prevailing time on Tuesday, November 17, 2026,** to the Pottsgrove School District, 1301 Kauffman Road, Pottstown, PA 19464, at which time bids will be publicly opened and read.

A **MANDATORY** pre-bid conference for **ALL** work scopes will be held at the Pottsgrove School District, located at 1301 Kauffman Road, Pottstown, PA 19464 at **10:00 am prevailing time on Monday, November 2, 2026**. Attendance by all Prime Bidders is mandatory.

The School District is requesting bids to be made “net of insurance” (OCIP) and will award the contract to the lowest responsible bidder “net of insurance,” all as more thoroughly described in the Contract Documents. Under this approach, Contractors and Subcontractors must remove the cost of Owner provided insurance from the Base Bid price. The lowest responsible bidder will be determined on a “net of insurance” basis. In other words, the Base Bid is to be identified by the Contractor, excluding costs and expenses for General Liability, Umbrella/Excess Liability, Workers’ Compensation, and Builder’s Risk Insurance as delineated in the contract documents. Alternate Bids and Unit Prices are also to be set forth, excluding cost for such insurance.

Construction will be bid for the following Work Scopes.

Work Scope No. 1: General Construction
Work Scope No. 2: Electrical Construction
Work Scope No. 3: Mechanical Construction
Work Scope No .4: Plumbing Construction

The Project Architect is GKO Architects, 300 Brookside Ave. Bldg. 18, Suite 150, Ambler, PA 19002, Phone: 215-646-2003. The Project Construction Manager is CMTA, Inc, 1400 North Providence Road, Building 2, Suite 4045 Media, PA 19063, Phone: 610-424-4172.

Work Scope 1 through 4: Documents will be available digitally through the ICS/CMTA Project Procore site. For electronic access to the bidding documents, contact Theresa Kalman at theresa.kalman@cmta.com. Bidders must supply the following information with their request for documents: the work scope(s) you are bidding on, company name, contact person, complete address, phone and cellular numbers, and email address. **Documents will be available on Wednesday, October 21, 2026**.

This Project is subject to the Pennsylvania Prevailing Wage Act (43 P.S. §§ 1651 et seq), as amended and supplemented. The Contractor shall comply with all requirements of the Act, and reference is made to the wage rates applicable to this Project.

By Resolution of the Pottsgrove School District

Ron Linke, Board Secretary / Business Administrator

SECTION 00 11 53 - CONTRACTOR QUALIFICATION STATEMENT

1.01 GENERAL

A. The AIA Document A305-2020 series forms with corresponding Exhibits that follow this page as listed below shall be completed by the Contractor and submitted in conjunction with Bids. Substitute forms will not be acceptable. All forms shall be fully executed by an authorized person, and notary seals applied where indicated.

1. A305-2020, Contractors Qualification Statement
2. A305-2020, Exhibit A – General Information
3. A305-2020, Exhibit B – Financial and Performance Information
4. A305-2020, Exhibit C – Project Specific Information
5. A305-2020, Exhibit D – Contractor's Past Project Experience. Contractor may duplicate Exhibit D for as many project examples as needed.

END OF SECTION 00 11 53

AIA® Document A305® – 2020

Contractor's Qualification Statement

THE PARTIES SHOULD EXECUTE A SEPARATE CONFIDENTIALITY AGREEMENT IF THEY INTEND FOR ANY OF THE INFORMATION IN THIS A305-2020 TO BE HELD CONFIDENTIAL.

SUBMITTED BY:
(Organization name and address.)

SUBMITTED TO:
(Organization name and address.)
Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

ADDITIONS AND DELETIONS:
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This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

TYPE OF WORK TYPICALLY PERFORMED
(Indicate the type of work your organization typically performs, such as general contracting, construction manager as constructor services, HVAC contracting, electrical contracting, plumbing contracting, or other.)

THIS CONTRACTOR'S QUALIFICATION STATEMENT INCLUDES THE FOLLOWING:
(Check all that apply.)

[ ] Exhibit A – General Information
[ ] Exhibit B – Financial and Performance Information
[ ] Exhibit C – Project-Specific Information
[ ] Exhibit D – Past Project Experience

CONTRACTOR CERTIFICATION
The undersigned certifies under oath that the information provided in this Contractor's Qualification Statement is true and sufficiently complete so as not to be misleading.

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User Notes: (6aa021fa5114a0c1ca3f19ef)

	BY:	Date
CONTRACTOR'S *Authorized Representative (Signature)*	*(Printed name and title)*	*Date*

NOTARY
State of:
County of:
Signed and sworn to before me this day of

Notary Signature

My commission expires:

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User Notes: (6aa021fa5114a0c1ca3f19ef)

AIA® Document A305® – 2020 Exhibit A

General Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

ADDITIONS AND DELETIONS:
The author of this document may have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

§ A.1 ORGANIZATION
§ A.1.1 Name and Location
§ A.1.1.1 Identify the full legal name of your organization.

§ A.1.1.2 List all other names under which your organization currently does business and, for each name, identify jurisdictions in which it is registered to do business under that trade name.

§ A.1.1.3 List all prior names under which your organization has operated and, for each name, indicate the date range and jurisdiction in which it was used.

§ A.1.1.4 Identify the address of your organization's principal place of business and list all office locations out of which your organization conducts business. If your organization has multiple offices, you may attach an exhibit or refer to a website.

§ A.1.2 Legal Status
§ A.1.2.1 Identify the legal status under which your organization does business, such as sole proprietorship, partnership, corporation, limited liability corporation, joint venture, or other.

.1 If your organization is a corporation, identify the state in which it is incorporated, the date of incorporation, and its four highest-ranking corporate officers and their titles, as applicable.

.2 If your organization is a partnership, identify its partners and its date of organization.

.3 If your organization is individually owned, identify its owner and date of organization.

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.4 If the form of your organization is other than those listed above, describe it and identify its individual leaders:

§ A.1.2.2 Does your organization own, in whole or in part, any other construction-related businesses? If so, identify and describe those businesses and specify percentage of ownership.

§ A.1.3 Other Information

§ A.1.3.1 How many years has your organization been in business?

§ A.1.3.2 How many full-time employees work for your organization?

§ A.1.3.3 List your North American Industry Classification System (NAICS) codes and titles. Specify which is your primary NAICS code.

§ A.1.3.4 Indicate whether your organization is certified as a governmentally recognized special business class, such as a minority business enterprise, woman business enterprise, service disabled veteran owned small business, woman owned small business, small business in a HUBZone, or a small disadvantaged business in the 8(a) Business Development Program. For each, identify the certifying authority and indicate jurisdictions to which such certification applies.

§ A.2 EXPERIENCE

§ A.2.1 Complete Exhibit D to describe up to four projects, either completed or in progress, that are representative of your organization's experience and capabilities.

§ A.2.2 State your organization's total dollar value of work currently under contract.

§ A.2.3 Of the amount stated in Section A.2.2, state the dollar value of work that remains to be completed:

§ A.2.4 State your organization's average annual dollar value of construction work performed during the last five years.

§ A.3 CAPABILITIES

§ A.3.1 List the categories of work that your organization typically self-performs.

§ A.3.2 Identify qualities, accreditations, services, skills, or personnel that you believe differentiate your organization from others.

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§ A.3.3 Does your organization provide design collaboration or pre-construction services? If so, describe those services.

§ A.3.4 Does your organization use building information modeling (BIM)? If so, describe how your organization uses BIM and identify BIM software that your organization regularly uses.

§ A.3.5 Does your organization use a project management information system? If so, identify that system.

§ A.4 REFERENCES

§ A.4.1 Identify three client references:
(Insert name, organization, and contact information)

§ A.4.2 Identify three architect references:
(Insert name, organization, and contact information)

§ A.4.3 Identify one bank reference:
(Insert name, organization, and contact information)

§ A.4.4 Identify three subcontractor or other trade references:
(Insert name, organization, and contact information)

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AIA® Document A305® – 2020 Exhibit B

Financial and Performance Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

ADDITIONS AND DELETIONS:
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§ B.1 FINANCIAL

§ B.1.1 Federal tax identification number:

§ B.1.2 Attach financial statements for the last three years prepared in accordance with Generally Accepted Accounting Principles, including your organization's latest balance sheet and income statement. Also, indicate the name and contact information of the firm that prepared each financial statement.

§ B.1.3 Has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?

§ B.1.4 Identify your organization's preferred credit rating agency and identification information.
(Identify rating agency, such as Dun and Bradstreet or Equifax, and insert your organization's identification number or other method of searching your organization's credit rating with such agency.)

§ B.2 DISPUTES AND DISCIPLINARY ACTIONS

§ B.2.1 Are there any pending or outstanding judgments, arbitration proceedings, bond claims, or lawsuits against your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A, Section 1.2, in which the amount in dispute is more than $75,000?
(If the answer is yes, provide an explanation.)

§ B.2.2 In the last five years has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 failed to complete work awarded to it?

.2 been terminated for any reason except for an owners' convenience?

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.3 had any judgments, settlements, or awards pertaining to a construction project in which your organization was responsible for more than $75,000?

.4 filed any lawsuits or requested arbitration regarding a construction project?

§ B.2.3 In the last five years, has your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management; or any of the individuals listed in Exhibit A Section 1.2:
(If the answer to any of the questions below is yes, provide an explanation.)

.1 been convicted of, or indicted for, a business-related crime?

.2 had any business or professional license subjected to disciplinary action?

.3 been penalized or fined by a state or federal environmental agency?

§ B.2.4 List any debarments, suspensions, and denials of prequalification of the organization for any federal, state, local, or governmental contracting.

§ B.2.5 List any prevailing wage disputes, investigations, or complaints filed against the firm or any officers.

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AIA® Document A305® – 2020 Exhibit C

Project Specific Information

This Exhibit is part of the Contractor's Qualification Statement, submitted by and dated the day of in the year
(In words, indicate day, month and year.)

PROJECT:
(Name and location or address.)

Pottsgrove School District
Pottsgrove Facilities & Athletic Improvements
1301 Kauffman Road
Pottstown, PA 19464

CONTRACTOR'S PROJECT OFFICE:
(Identify the office out of which the contractor proposes to perform the work for the Project.)

TYPE OF WORK SOUGHT
(Indicate the type of work you are seeking for this Project, such as general contracting, construction manager as constructor, design-build, HVAC subcontracting, electrical subcontracting, plumbing subcontracting, etc.)

CONFLICT OF INTEREST
Describe any conflict of interest your organization, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, or any of the individuals listed in Exhibit A Section 1.2, may have regarding this Project.

§ C.1 PERFORMANCE OF THE WORK

§ C.1.1 When was the Contractor's Project Office established?

§ C.1.2 How many full-time field and office staff are respectively employed at the Contractor's Project Office?

§ C.1.3 List the business license and contractor license or registration numbers for the Contractor's Project Office that pertain to the Project.

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DRAFT

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§ C.1.4 Identify key personnel from your organization who will be meaningfully involved with work on this Project and indicate (1) their position on the Project team, (2) their office location, (3) their expertise and experience, and (4) projects similar to the Project on which they have worked.

§ C.1.5 Identify portions of work that you intend to self-perform on this Project.

§ C.1.6 To the extent known, list the subcontractors you intend to use for major portions of work on the Project.

§ C.2 EXPERIENCE RELATED TO THE PROJECT

§ C.2.1 Complete Exhibit D to describe up to four projects performed by the Contractor's Project Office, either completed or in progress, that are relevant to this Project, such as projects in a similar geographic area or of similar project type. If you have already completed Exhibit D, but want to provide further examples of projects that are relevant to this Project, you may submit additional copies of Exhibit D as needed.

§ C.2.2 State the total dollar value of work currently under contract at the Contractor's Project Office:

§ C.2.3 Of the amount stated in Section C.2.2, state the dollar value of work that remains to be completed:

§ C.2.4 State the average annual dollar value of construction work performed by the Contractor's Project Office during the last five years.

§ C.2.5 List the total number of projects the Contractor's Project Office has completed in the last five years and state the dollar value of the largest contract the Contractor's Project Office has completed during that time.

§ C.2.6 List any work the organization has performed for the Owner.

§ C.2.6 Other public work that the organization has performed in Pennsylvania (up to ten most recent projects). For each, identify the name and address of owner, location of project, nature of contract (prime, sub, etc.), contract amount, change orders, final contract amount, if completed on time, kind of work, and nature of project.

§ C.2.7 Other projects involving multi-prime contracts on which the organization has served as a prime contractor (up to ten most recent projects). For each, identify the name and address of owner, location of project, nature of contract (prime, sub, etc.), contract amount, change orders, final contract amount, if completed on time, kind of work, and nature of project.

§ C.2.8 Portion of the contract to the nearest ten percent (10%) that the bidder expects to perform using its own labor and

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equipment.

§ C.3 SAFETY PROGRAM AND RECORD

§ C.3.1 Does the Contractor's Project Office have a written safety program?

§ C.3.2 List all safety-related citations and penalties the Contractor's Project Office has received in the last three years.

§ C.3.3 Attach the Contractor's Project Office's OSHA 300a Summary of Work-Related Injuries and Illnesses form for the last three years.

§ C.3.4 Attach a copy of your insurance agent's verification letter for your organization's current workers' compensation experience modification rate and rates for the last three years.

§ C.4 INSURANCE

§ C.4.1 Attach current certificates of insurance for your commercial general liability policy, umbrella insurance policy, and professional liability insurance policy, if any. Identify deductibles or self-insured retentions for your commercial general liability policy.

§ C.4.2 If requested, will your organization be able to provide property insurance for the Project written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis?

§ C.4.3 Does your commercial general liability policy contain any exclusions or restrictions of coverage that are prohibited in Article 11 of the General Conditions? If so, identify.

§ C.5 SURETY

§ C.5.1 If requested, will your organization be able to provide a performance and payment bond for this Project?

§ C.5.2 Surety company name:

§ C.5.3 Surety agent name and contact information:

§ C.5.4 Total bonding capacity:

§ C.5.5 Available bonding capacity as of the date of this qualification statement:

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AIA® Document A305® – 2020 Exhibit D

Contractor's Past Project Experience

	1	2	3	4
PROJECT NAME				
PROJECT LOCATION				
PROJECT TYPE				
OWNER				
ARCHITECT				
CONTRACTOR'S PROJECT EXECUTIVE				
KEY PERSONNEL (include titles)				
PROJECT DETAILS	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work	Contract Amount Completion Date % Self-Performed Work
PROJECT DELIVERY METHOD	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:	☐ Design-bid-build ☐ Design-build ☐ CM constructor ☐ CM advisor ☐ Other:
SUSTAINABILITY CERTIFICATIONS				

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SECTION 00 21 13 - INSTRUCTIONS TO BIDDERS

The INSTRUCTIONS TO BIDDERS, American Institute of Architects (AIA), AIA Document A701-2018, containing Articles 1 through 8, are hereby made part of this Project Manual and bound herein.

Refer to Section 01 11 00 – Summary of Work for scope of work for the bid packages.

AIA® Document A701® – 2018

Instructions to Bidders

for the following Project:
(Name, location, and detailed description)

Pottsgrove High School Facilities & Athletic Improvement Project
Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

THE OWNER:
(Name, legal status, address, and other information)

Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

THE ARCHITECT:
(Name, legal status, address, and other information)

Godshall Kane O'Rourke Architects, LLC (GKO Architects, LLC)
300 Brookside Avenue
Ambler Yards, Building 18, Suite 150
Ambler, PA 19002

TABLE OF ARTICLES

1 DEFINITIONS

2 BIDDER'S REPRESENTATIONS

3 BIDDING DOCUMENTS

4 BIDDING PROCEDURES

5 CONSIDERATION OF BIDS

6 POST-BID INFORMATION

7 PERFORMANCE BOND AND PAYMENT BOND

8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.

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ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

.1 the Bidder has read and understands the Bidding Documents;

.2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;

.3 the Bid complies with the Bidding Documents;

.4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;

.5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception;

.6 the Bidder has investigated all required fees, permits and regulatory requirement of authorities have jurisdiction and has properly included in the submitted bid the cost of all necessary administrative costs, insurances, business privilege licenses, certifications, or taxes to apply for the necessary permits required to perform the Work unless otherwise indicated as provided by the Owner. Refer to Specification Section 00 72 00 General Conditions of the contract for fees that the Owner is responsible for;

.7 the Bidder has incorporated into the Bid adequate sums for work performed by installers whose qualifications meet those indicated in the Procurement and Contracting Documents;

.8 the Base Bid is made without applicable cost for Workers' Compensation, General Liability, Umbrella/Excess, or Builder's Risk insurance being included, in accordance with contract documents. Alternate Bids and Unit Prices are also to be set forth excluding cost for such insurance;

.9 that it is aware and has been advised that the Contractor is solely responsible for initiating, maintaining and supervising all safety precautions and programs required under its portion of the Work and their

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Subcontractors and Sub-subcontractors Work and that the Contractor shall review, evaluate and take into consideration these requirements when making its bid.

.10 that it is aware and has been advised that Subcontractors and Sub-subcontractors ought to be given these requirements for bidding purposes so as to ensure consistency and contract adherence.

.11 that it will require each Subcontractor and each Sub-subcontractor, through legally enforceable written Contracts, to meet all of the responsibilities of the Contractor with respect to any portion of the Work performed by any Subcontractor or Sub-subcontractor.

.12 the Owner reserves the right to view the insurance cost data of any bidder to ensure that the School District, has been provided with the proper credits with respect to the Contractor's bids without insurance.

.13 the Bidder is a properly licensed Contractor according to the laws and regulations of the State of Pennsylvania and meets the qualifications indicated in the Procurement and Contracting Documents;

a. To demonstrate qualifications to perform the Work, each Bidder must be prepared to submit within five (5) business days of Owner's request, written evidence such as financial data, insurance certificates, previous experience of the Bidder and its assigned personnel, present commitments, and any other information that may be requested by the Owner. Each Bid must contain evidence of Bidder's qualification to do business in the Commonwealth of Pennsylvania, or covenant to obtain such qualification prior to award of the Contract. Owner reserves the right to reject Bidder if he cannot satisfy all of the Qualification Requirements, including those listed in the Technical Specifications.

b. In determining the lowest responsible Bidder, the Owner will consider the integrity, efficiency, and experience of the Bidder and its assigned personnel, promptness, current workload, financial capability, performance on recent projects, references from owners, architects, and engineers, list of potential sub-contractors, schedule of values, and ability to successfully and timely complete the Project. The apparent low Bidder must demonstrate competency and provide any or all of the above information requested within five (5) business days of request. Owner reserves the right to reject the Bidder as non-responsive if all the information is not received on time and/or does not reasonably satisfy the Owner's evaluation process.

c. In addition to all the requirements listed above regarding qualifications of Bidders, the Owner will evaluate Bidders using the following additional criteria:

1) The Bidder and its assigned personnel must have successfully performed a minimum of 3 previous Pennsylvania public school projects within the last 5 years of similar type or a contract value of at least seventy percent (70%) of the amount of the Bidder's Base Bid. Provide references including telephone number and contact person.

2) The Bidder shall perform not less than ten percent (10%) of the actual construction Work with staff employed directly by the Bidder. Project management shall NOT be included in this percentage.

3) The Bidder, or its assigned personnel, must have successfully performed at least 3 Pennsylvania public school projects within the last 5 years where they have managed multiple trades and coordinated and scheduled all the activities for projects as per above Article 1. Provide references including telephone number and contact person.

4) The Bidder's performance on previous projects including claims, litigation, coordination of work, staffing, and timely completion. If it is determined that the Bidder has not fully performed previous projects in a coordinated, timely, and good and workmanlike manner, the Owner reserves the right to reject the Bid.

d. All Bidders should be aware that the Owner encourages and promotes MBE (Minority Business Enterprise) and WBE (Women's Business Enterprise) participation for this Project. Bidders are encouraged to do their own research on qualifications, and other factors, in preparing a comprehensive and responsible bid.

e. The Bidder acknowledges that a condition of the Contract is that time is of the essence of the Contract and the number of calendar days within which, or the dates by which, the Work is to be substantially completed and finally completed and ready for final payment (the Contract Time) are set forth in the Contract Documents and are accepted by the Bidder without exception or conditions.

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ARTICLE 3 BIDDING DOCUMENTS

§ 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, as indicated below, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.
(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)

Bid documents are distributed electronically.

§ 3.1.2 The deposit sum, if any for the Bidding Documents is non-refundable.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically requested. It is the Prime Bidder's responsibility to provide bidding documents to its subcontractors.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents. Bidder is responsible to make sure that the set of Bidding Documents is complete and that any printed contract document is legible and represents properly all the information as represented in the PDF file.

.1 Bidders shall thoroughly examine and be familiar with the Specifications and Drawings. The failure or omission of any Bidder to receive or examine any form, instrument, document, or visit the site and acquaint himself with conditions there existing, shall in no way relieve any Bidder from obligation with respect to his Bid. By submitting a Bid, the Bidder agrees and warrants that he has examined the site and the Specifications and Drawings and, where Specifications and/or Drawings require in any part of the Work a given result to be produced, that the Specifications and Drawings are adequate, the required result can be produced under the Specifications and Drawings, and that the proposed schedule affords the Bidder sufficient time to complete the Work if award the Contract. No claim for any additional costs or additional time will be allowed because of alleged impossibilities in the production of the results specified or because of inadequate or improper plans and specifications and whenever a result is required, the successful Bidder shall furnish any and all extras and make any changes needed to produce the required result for the sum stated in the form of proposal.

.2 Should any Bidder find discrepancies, duplications, errors, or omissions in the documents or have doubt as to the meaning expressed by the Contract Documents, he shall make inquiry at once in writing to the Architect and/or Construction Manager. Where changes, corrections, or clarifications to Contract Documents are deemed necessary by the Architect and/or Construction Manager, he will issue written Addenda accordingly. Addenda shall be a part of the Contract Documents. No oral, telephone, or letter instructions will be considered as having effect upon the Contract Documents; Addenda only shall constitute change to them. Bidders and sub-Bidders are urged to make early examination of Contract Documents and make inquiries about them, if necessary, even though prices may not be determined until late in the bidding period. No claim for additional cost or time will be permitted for any discrepancies, duplications, errors, or omissions in the Contract Documents for any such matters that were apparent to them or discoverable by the Bidder though a complete review of the Contract Documents prior to submission of the bid.

.3 Information and data reflected in the Contract Documents with respect to underground facilities at or contiguous to the site is based upon information and data furnished to Owner and Architect and/or Construction Manager by owners of such underground facilities or others. Owner and Architect and/or Construction Manager do not assume responsibility for the accuracy or completeness of the location of underground facilities at or contiguous to the site. Successful Bidder shall verify the location of all underground utilities prior to any excavation.

.4 The Owner, Architect, and Construction Manager will not be responsible for the adequacy of data furnished to prospective Bidders on subsurface conditions, underground facilities, and other physical conditions. This information is provided based on information available. Bidder assumes responsibility for verifications, adjustments, and modifications that may be required since this is generally recognized as inherent to the work of the Contract Documents.

.5 Successful Bidder for the General Contract is responsible, on behalf of the Owner, for providing the physical markings of all existing utilities including those on site as indicated on the drawings, if any, or those that may be identified in the field. The locations shown on the drawings are approximate. The Bidder must include in his proposal the cost for hand-dug test holes, or other means, to ascertain the precise position of such underground facilities on the site owned by the Owner. This verification should be performed for any utilities to be

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relocated, removed, modified, or that may otherwise interfere with planned work. The utilities in the public right of way will be identified and marked by the appropriate facility owner as per the requirements of the PA One Call Act as amended. Physical layout is to be performed in full compliance with the PA One Call PA Act 287 of 1974 as amended by Act 18 of 1996 and Act 50 of 2017.

.6 Before submitting a Bid, each Bidder will, at Bidder's expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing the Work and which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents.

.7 On request in advance, Owner will provide each Bidder access to the site to conduct such explorations and tests, as each Bidder deems necessary for submission of a Bid. Bidders shall fill all holes, clean up, and restore the site to its former condition upon completion of such explorations.

.8 The lands upon which the Work is to be performed, rights-of-way, and easements for access thereto and other lands designated for use by the Bidder in performing the Work are identified in the Contract Documents. All additional land and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by Bidder. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by Owner unless otherwise provided in the Contract Documents;

.9 The submission of a Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of the Bidding Documents and that without exception, the Bid is premised upon performing and furnishing the Work required by the Contract Documents and such means, methods, techniques, sequences, or procedures of construction as may be indicated in or required by the Contract Documents, and that the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

§ 3.1.6 Owner, Architect, and Construction Manager, in making copies of the Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

§ 3.1.7 Provisions for liquidated damages are set forth in the Contract Documents.

§ 3.1.8 Retainage will be in accordance with the Contract Documents. Reference Article 9.3.4 of the General Conditions.

§ 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2 of these Instructions to Bidders.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect and Construction Manager at least five (5) business days prior to the date for receipt of Bids.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)

All Bidders shall submit requests for clarification or interpretation of the Bidding Documents through email to the parties listed in Article 3.4.2 of these Instructions to Bidders.

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

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§ 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

§ 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2. The various materials and products specified in the specifications by name or description are given to establish a minimum acceptable standard of quality and of cost for bid purposes. When proprietary names are used, and there does not follow a "listing" of acceptable approved manufacturers and/or products, then the proprietary named item must be included in the Bid proposal without substitution. When proprietary names are used, and there follows a "listing" of acceptable "approved" manufacturers and/or products, then the Bidder may base the Bid on either the proprietary product or any from the "listing" acceptable "approved" manufacturers and/or products for the Base Bid and alternate Bid as indicated. When proprietary names are used, and there are alternates on the Bid form, then the Bidder shall base his Bid on the proprietary product or any from the "listing" of approved manufacturers and/or products for the Base Bid and alternate bid(s) as indicated. Bidders may request approval prior to Bid opening of non-listed items as substitutions in accordance with these specifications and Instructions to Bidders. No substitutions will be considered prior to receipt of Bids unless written request for approval has been received by the Architect only from prime contract Bidders at least ten (10) business days prior to the date for receipt of Bids. Such requests shall be in accordance with substitution request procedure listed in this Article 3.3 of these Instructions to Bidders, and any other requirements at the Architect, Owner, or Construction Manager's discretion. Unless the Bidder obtains approval of a substitution prior to the submission of Bids, the Bidder must furnish the specified or listed item regardless of whether or not they were included in his Bid. The Bidder shall be required to coordinate and pay for any conditions which are required to accommodate the listed or alternate item, including the reimbursement of other affected prime contractors if the project is a multi-prime project .

§ 3.3.2.2 Bidders shall submit substitution requests on a Substitution Request Form if one is provided in the Bidding Documents as Section 00 43 25 and should include:

- **.1** Technical, warranty, and manufacturer's data specified. A line-by-line comparison of all specified items in the Specification must be made. Submission must be made ten (10) business days prior to Bid opening.
- **.2** Architect will review submission and any acceptable substitutions will be listed in an addendum. All manufacturers not specifically approved as a substitution by addendum shall not be considered;
- **.3** Only manufacturers that are qualified prior to the Bid opening will be considered acceptable manufacturers.

§ 3.3.2.3 Intentionally deleted.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them. If a proposed substitution is not specifically approved by addendum, it shall be considered rejected.

§ 3.3.5 No substitutions will be considered after the Contract award absent proof that the specified item is not commercially available and cannot be provided through no fault of the Bidder.

§ 3.4 Addenda

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)

Addenda are distributed electronically to all Contacts on the current invited bidder list and to any others upon request.

§ 3.4.2 All questions about the meaning or intent of the Contract Documents are to be directed to the parties listed below. Interpretations or clarifications considered necessary by the Architect in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Architect and/or Construction Manager as having received the Bidding Documents. Questions received less than five (5) business days prior to the date for opening of Bids may not be answered. Only interpretations or clarifications issued by formal written Addenda will be binding. Oral or other

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interpretations or clarifications will be without legal effect. All questions must be submitted in writing as follows. Phone calls are not permitted.

.1 All questions must be sent to:
CMTA, Inc.
Contact: Scott Kennedy, Senior Project Manager, scott.kennedy@cmta.com

.2 All MEP questions must be copied to:
GKO Architects
Contact: Kevin Godshall, kevin@gkoarchitects.com

.3 All Civil questions must be copied to:
K&W Engineers
Contact: Carolyn DuBois, cdubois@kandwengineers.com

.4 All questions must be copied to:
CMTA, Inc.
Contact: Scott Kennedy, Senior Project Manager, scott.kennedy@cmta.com

§ 3.4.3 Addenda may also be issued at any time to modify the Bidding Documents as deemed advisable by Construction Manager, Owner, or Architect.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt of each Addendum in the space indicated on the Project Bid Form(s).

ARTICLE 4 BIDDING PROCEDURES

§ 4.1 Pre-Bid Conference

§ 4.1.1 The Pre-bid Conference will be held on the date and time listed in the Advertisement for Bids. Representatives of Owner, Construction Manager, and Architect will be present to discuss the Project. Architect and Construction Manager will transmit to all prospective Bidders of record such Addenda, as Architect considers necessary in response to questions arising at the Conference.

§ 4.1.2 The site may be made available for visits at the pre-bid conference and at the other specific dates and times determined at the pre-bid.

(Paragraphs deleted)

§ 4.2 Preparation of Bids

§ 4.2.1 Bids shall be submitted in duplicate on the forms included with or identified in the Bidding Documents. **THE BID FORM SHALL NOT BE ALTERED. ALTERED BID FORMS MAY BE CONSIDERED NON-RESPONSIVE AND MAY BE REJECTED.**

§ 4.2.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.2.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.2.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.2.5 Alternates:

.1 The Bidder agrees to modify the Base Bid by the amounts stated for alternates as requested on the Bid Form and specified in the Bidding documents.

.2 The Owner shall have the right to accept or reject alternates in any order or combination, and to determine the low Bidder on the basis of the sum of the Base Bid and alternates accepted.

.3 Alternate work shall be completed within the same time frame as indicated on the Contract Documents for associated work. No alternate shall modify the project material allowances unless stated within the allowance description.

.4 The Bidder shall provide a response for every Alternate listed on the Bid Form by entering an ADD amount, a DEDUCT amount, "NO CHANGE," or "NO BID," as applicable. "NO CHANGE" indicates that the Bidder shall perform the Alternate Work with no adjustment to the Base Bid.

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.5 "NO BID" indicates that the Bidder declines to provide the Alternate Work. Failure to provide a response for any Alternate may render the Bid non-responsive and subject to rejection by the Owner. If the Owner elects to accept an Alternate for which the Bidder has entered "NO BID," the Bidder shall not be eligible for award of the Contract.

.6 Enter the amount for each alternate on the line pre-marked as "ADD" and/or "DEDUCT". Where both the words "ADD" and "DEDUCT" are provided for an alternate, strike through one of the words so that the appropriate word remains.

.7 The failure to enter an amount of "NO CHANGE" or "NO BID" in the blanks for an alternate shall be treated conclusively as a Bid of zero dollars for the work described in the alternate.

§ 4.2.6 The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which must be filled in on the Bid Form). Properly issued Addenda shall be binding upon all Bidders, regardless of whether a Bidder fails to acknowledge receipt.

§ 4.2.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.2.8 A Bidder shall incur all costs associated with the preparation of its Bid.
§ 4.2.9 Bidder shall include all applicable sales and use taxes in its bid. Bidder shall consult Section 3.6 of the General Conditions regarding the Owner's exemption from sales and use tax on "building machinery and equipment" and comply with all provisions set forth therein.

§ 4.3 Bid Security
§ 4.3.1 Each Bid shall be accompanied by the following bid security:
(Insert the form and amount of bid security.)

Certified Check or Bid Bond in the amount of 10 percent (10%) of the total bid.

(Paragraphs deleted)
§ 4.3.2 No bid will be considered unless it is accompanied by a Bid Security in the amount of ten percent (10%) of the total bid payable without condition to the Owner. Bid Security shall be in the form of a Certified/Bank Cashier's Check or Bid Bond in the form provided in the documents, and shall be submitted with the express understanding that it shall be a guarantee that the Bidder will not withdraw his/her bid for a period of sixty (60) days after the date specified for receipt of bids, that the Bidder will enter into a formal Contract with the Owner; and that the Bidder will submit the required Performance, Labor and Material Payment Bonds, Certificates of Insurance as specified and Public Works Employment Verification Forms. In the event of withdrawal of the Bid by the Bidder, the Bidder will forfeit the full amount of the Bid Bond (Guarantee). All Certified Checks will be returned to the Bidders after the Owner and the successful Bidder have executed the Contract; and the executed Performance and Labor and Material Payment Bonds and Certificate of Insurance have been approved by the Owner.

§ 4.3.3 If Bid Bond is provided as the bid security, it shall be written on the form provided in the Bidding Documents. No other forms will be accepted. The attorney-in-fact who executes the Agreement or Surety or bid bond on behalf of the surety shall affix a certified and current copy of an acceptable power of attorney, authorizing said attorney-in-fact to act on behalf of the surety. The Power of Attorney must be dated the same date as the Bid Bond, or if dated prior to the date of the submission of the bid security, the Power of Attorney shall have a Certification that certifies that the Power of Attorney remains in full force and effect as of the date of the bid security, and both the bid security and Power of Attorney shall have affied the raised corporate seal of the surety The Bid Bond form must be executed by a surety licensed and authorized to conduct business as a surety within the Commonwealth of Pennsylvania, have an AM Best rating of 'A-' or higher and a financial rating of Class X or higher and shall be named in the current list of companies holding Certificates of Authority as acceptable sureties on federal bonds and/or as acceptable reinsuring companies as published in Circular 570 (as amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department, and the amount of the bond shall not exceed the underwriting risk of such surety set forth in said circular of revisions thereof.

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§ 4.3.4 If the Bid Security is submitted in the form of a certified check or bank cashier's check, the Bidder shall submit an Agreement of Surety certifying that a surety company will provide the Bidder with a Performance Bond and Payment Bond each in the amount of one hundred percent (100% of the Contract Sum). The Agreement of Surety shall be in the form included in the Bidding Documents as Section 00 43 15. The Agreement of Surety shall be executed by a surety satisfying the requirements set forth in the Contract Documents.

§ 4.3.5 The Owner will have the right to retain the bid security of the three (3) lowest Bidders to whom an award is being considered until (a) the Contract has been executed and bonds, if required, have been furnished; (b) the specified time has elapsed so that Bids may be withdrawn; or (c) all Bids have been rejected. However, if no Contract has been awarded or a Bidder has not been notified of the acceptance of its Bid, a Bidder may, beginning sixty-one (61) days after the opening of Bids, withdraw its Bid and request the return of its bid security. Upon request, the Bid Security of the other Bidders will be returned by the Owner after the Owner and successful Bidder have executed a Contract. The Owner shall not be liable for any interest on Bid Security which is held in accordance with these Instructions to Bidders.

§ 4.4 Submission of Bids

§ 4.4.1 A Bidder shall submit its Bid as indicated below:

(Indicate how, such as by website, host site/platform, paper copy, or other method Bidders shall submit their Bid.)

Paper copy of the bid, bid security and any other documents required enclosed in a sealed envelope, addressed/labeled per instructions and delivered to the Bid Opening site prior to the bid date/time.

§ 4.4.2 Paper copies of the Bid, the bid security, and any other documents listed in Specification Section 00 43 93, Bid Submittal Attachments, are required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address, and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

§ 4.4.3

(Paragraphs deleted)

Bids shall be submitted by the date and time and at the place indicated in the invitation to bid. Bids submitted after the date and time for receipt of Bids, or at an incorrect place, will not be accepted.

§ 4.4.4 The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

§ 4.4.5 A Bid submitted by any method other than as provided in this Section 4.4 will not be accepted.

§ 4.4.6 By submitting the Bid, the Contractor is certifying that it has excluded all insurance costs from the Base Bid, Alternates, and Unit Prices with respect to those insurance coverages that will be provided because the Owner is implementing the OCIP as set forth in the Contract Documents. The Contractor further certifies and represents that the Owner may rely on the Contractor's representation that it has removed all such insurance costs from the Base Bid, Alternates, and Unit Prices and that the Owner is justified in relying upon said representation.

§ 4.5 Modification or Withdrawal of Bid

§ 4.5.1 Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.5.2 Bids shall be irrevocable for sixty (60) days after the actual day of opening thereof unless the Owner is delayed in awarding the Contract due to the failure to receive a required approval/permit from one or more reviewing bodies/governmental agencies having jurisdiction over the Project, the sale of bonds, or the award of a grant, in which case, Bids shall be irrevocable for 120 days after Bid opening. Absent an exception for extending time for the award of the

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Contract, the Owner and the lowest responsible and responsive Bidder may mutually agree in writing to extend the time for the Owner to award the Contract.

§ 4.5.3 Neither the designation of the apparent lowest responsible Bidder, nor the issuance of a Notice of Intent to Award to the Bidder so designated shall operate to release any other Bidder from its Bid. Each such other Bidder, unless earlier released from its Bid by specific action of the Owner, shall remain bound by its Bid until the earlier of (1) the date of actual execution by Owner of the Agreement Between Owner and Contractor with the Bidder whom the Award of Contract has been made, or (2) the expiration of the firm Bid period stipulated above.

§ 4.5.4 Negligence by the Bidder in preparing his Bid confers no right of withdrawal or modification of his proposal after such proposal has been opened. No claims on account of mistakes or omissions of any proposal will be considered. Notwithstanding the above, after the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two (2) business days, after the Bid opening time in accordance with the Public Contracts – Withdrawal of Bids Law, Act of January 23, 1974, P.L. 9, No. 4, 73 P.S. §1601 et seq., as amended. A Bid which has been opened may be withdrawn only in accordance with the causes set forth in said Act and for no other reasons. Strict compliance with said Act is required to withdraw a Bid after opening. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.5.4,

, then (1) the withdrawing bidder shall not supply any material or labor to, or perform any subcontract or other work agreement for any person to whom a contract or subcontract is awarded in the performance of the contract for which the withdrawn bid was submitted, without the written approval of the Owner, (2) , the Owner may award the contract to the next lowest responsive and responsible bidder or reject all bids and rebid, (3) if the Owner elects to rebid, then the withdrawing bidder shall pay the costs of printing new contract documents and required advertising and upon receipt of such costs, the Owner will return the withdrawing bidder's bid security, and (4) if the Owner elects to award to the next lowest responsible and responsive bidder, then the Owner will return the bid security of the withdrawing Bidder following execution of the contract with the next lowest responsible and responsive bidder

ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 Opening of Bids

Bids properly identified and received within the specified time limits will be publicly opened and read aloud. A summary of the Bids may be made available to Bidders after opening of the Bids.

§ 5.2 Rejection of Bids

§ 5.2.1 The Owner shall have the right to reject any or all Bids.

§ 5.2.2 More than one proposal for the contract from an individual, partnership, corporation, or an association under the same or different name will be grounds for the rejection of all proposals in which such Bidder is interested. Any or all proposals will be rejected if there is reason for believing that collusion exists among any of the Bidders. Participants in such collusion will not be considered in future proposals. A Non-Collusion Affidavit shall be executed, notarized, and submitted with the Bidder's proposal using the form set forth in Specification Section 00 45 19.

§ 5.3 Acceptance of Bid (Award)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest responsive and responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents. The Owner reserves the right to reject any and all bids. The Owner reserves the right to waive informalities and irregularities, technicalities, or non-material defects in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's best interests and in accordance with law. The Owner reserves the right to disregard all nonconforming, non-responsive, unbalanced, or conditional bids. Also, Owner reserves the right to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by the Bidding Documents. Discrepancies in the multiplication of units of Work and unit prices will be resolved in favor of the correct sum.

§ 5.3.2 Unless otherwise prohibited by law, the Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the lowest responsive and responsible Bidder on the basis of the sum of the Base Bid and Alternates accepted. Alternates offered by the Bidder and not listed on the Bid Form will not be considered; nor will they be a determining factor in the low Bidder.

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§ 5.3.3 In evaluating Bids, Owner will consider the qualifications of such Bidders, whether or not the Bids comply with the prescribed requirements, and such alternates, unit prices and other data, as may be requested in the Bid Form or prior to the Notice of Award.

§ 5.3.4 Owner may consider the qualifications and experience of Subcontractors, suppliers, and other persons or organizations proposed for any portions of the Work requested by Owner. Owner also may consider the operating costs, maintenance requirements, performance data, and guarantees of major items of materials and equipment proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

§ 5.3.5 Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualification, and financial ability of Bidders, subcontractors, suppliers, and other persons or organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

§ 5.3.6 If the Contract is to be awarded, Owner will give the Successful Bidder a Notice of Intent to Award within sixty (60) days after the day of Bid opening unless extended as set forth in these Instructions to Bidders.

ARTICLE 6 POST-BID INFORMATION

§ 6.1 Contractor's Qualification Statement

Intentionally deleted.

§ 6.2 Owner's Financial Capability

Intentionally deleted.

§ 6.3 Submittals

§ 6.3.1 After notification of selection for the award of the Contract, and after the Owner or Construction Manager's request, submit in writing to the Owner and the Construction Manager within five (5) business days :

- **.1** a designation of the Work to be performed with the Bidder's own forces;
- **.2** names of the principal products and systems proposed for the Work and the manufacturers and suppliers of each; and
- **.3** names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for the principal portions of the Work;
- **.4** All Subcontractors proposed for the project shall have been in business for a minimum of five (5) years and must have a successful record of completing, at a minimum, five (5) projects of similar size and cost. Subcontractors must also have business insurance including commercial general liability insurance, automotive liability insurance, and worker's compensation insurance, adequate resources of manpower, tools, and equipment and must meet the IRS criteria for an independent contractor. Contractors shall reference the IRS website for the definition of an independent contractor: https://www.irs.gov/businesses/small-businesses-self-employed/independent-contractor-self-employed-or-employee
- **.5** At the Owner or Construction Manager's request, the identity of certain Subcontractors, suppliers, and other persons or organizations (including those who are to furnish the principal items of material and equipment) is to be submitted to Owner and Construction Manager in advance by the apparent Successful Bidder, and any other Bidder so requested. Within five (5) business days after the Owner's request, submit to Owner a list of all such Subcontractors, suppliers, and other such persons or organizations proposed for those portions of the Work for which such identification is required. An experience statement shall accompany such list with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor, supplier, person, or organization if requested by Owner. If Owner and Construction Manager, after due investigation, have reasonable objections to any proposed Subcontractor, supplier, and other person or organization, then Owner may, before the Notice to Proceed is given, request the apparent Successful Bidder to submit an acceptable substitute without an increase in Bid Price.

§ 6.3.2 The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

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§ 6.3.3 Intentionally deleted.

§ 6.3.4 Intentionally deleted.

§ 6.3.5 Pennsylvania Prevailing wage rates will apply to this project. The Contractor and its subcontractors shall comply with the provisions, duties, obligations, remedies, and penalties of the Pennsylvania Prevailing Wage Act, 43 P.S. § 165-1 et seq. which is incorporated herein by reference as if fully set forth herein. The general prevailing minimum wage rates, as determined by the Secretary of Labor and Industry shall be paid for each craft or classification of all workmen needed to perform work on the Project during the term hereof for the locality in which the work is to be performed.

ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND

§ 7.1 Bond Requirements

§ 7.1.1 The Bidder shall furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder.

§ 7.1.2 Refer to Specification Section 00 72 00 General Conditions of the Contract for Construction for complete Bond Requirements.

§ 7.1.3 The apparent low Bidder must provide Payment and Performance Bonds in the forms included in the Contract Documents and all Certificates of Insurance or other insurance information as required pursuant to the General Conditions of the Contract and Public Works Employment Verification Form within ten (10) business days of the issuance of Notice of Intent to Award. Other bond forms will not be accepted. Failure of the apparent low Bidder to provide original executed Payment and Performance Bonds in the required form within the required time will result in forfeiture of the Bid Security.

§ 7.1.4 Unless otherwise indicated below, the Penal Sum of the Payment and Performance Bonds shall be the amount of the Contract Sum.
(If Payment or Performance Bonds are to be in an amount other than 100% of the Contract Sum, indicate the dollar amount or percentage of the Contract Sum.)

§ 7.2 Time of Delivery and Form of Bonds

§ 7.2.1 The Bidder shall deliver the required Performance and Payment bonds to the Owner not later than ten (10) business days following the date of execution of the Contract. If the Work is to commence sooner in response to a letter of intent, the Bidder shall, prior to commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 The bonds shall be written on the forms included in the Contract Documents. No other forms will be accepted.

§ 7.2.3 The bonds shall be dated on or before the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix to the bond a certified and current copy of the power of attorney.

ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, as modified, unless otherwise stated below.

(Paragraphs deleted)

.2 AIA Document A232™–2019, General Conditions of the Contract for Construction, as modified, unless otherwise stated below.

.3 Intentionally Omitted as it is Not Applicable.

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.4 Intentionally Omitted as it is Not Applicable.

.5 Drawings: As issued in the Contract Documents.

(Table deleted)

.6 Specifications: As issued in the Contract Documents.

(Table deleted)

.7 Addenda: As issued prior to the Bid Date published in the Bidding Documents.

(Table deleted)

.8 Other Exhibits:
(Check all boxes that apply and include appropriate information identifying the exhibit where required.)

Exhibit C – Contractor's completed Bid Form
Exhibit D - Contractor's executed Non-Collusion Affidavit
Exhibit E – Contractor's executed Public Work Employment Verification Form
Exhibit F – Contractor's executed Performance and Payment Bonds
(Paragraphs deleted)
Exhibit G – Contractor's Certificate of Insurance
(Table deleted)

.9 Other documents listed below:
(List here any additional documents that are intended to form part of the Proposed Contract Documents.)

Owner Controlled Insurance Program (OCIP)

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PROGRAM 11

EXHIBIT B – PROJECT SAFETY PLAN
December 2020 EDITION

- This tab is designed to provide uniform policies and procedures associated with Health and Safety.
- The Document can be used by School Districts and their Consultants as a Contract Attachment in order to supplement any other safety terms and conditions deemed necessary for the project in question.

Confirmation of this Project Safety & Health Management Plan Project Requirements

As used in this Safety and Health Management Plan (herein referred to as “Plan”), "Contractor" shall mean the controlling Contractor (who has a contractual agreement with the Owner), who shall comply with these requirements. The Contractor shall also agree to require each of their Subcontractors and Sub-subcontractors to comply with this Plan.

It is the responsibility of the Contractor to maintain total control of Safety to ensure that employees and the general public will be provided with an environment free of recognized hazards during construction and renovation activities. This Plan does not relieve the Contractor of their responsibilities regarding the safety of their employees and the preservation of property.

The Federal Occupational Safety and Health Act as well as other federal, state, and local regulations promulgated in the Interest of Safety are required by law and this Plan.

The Safety Requirements of this Plan is a supplementary document to all Government rules and regulations. It does not negate, abrogate, alter or otherwise change any provisions of those rules and/or regulations, and is intended to supplement and enforce the individual program of each Contractor and the overall safety effort. It is understood that the ultimate responsibility for providing a safe workplace rests with each individual Contractor.

I hereby acknowledge that I have received, read and evaluated the Project Safety and Health Management Plan and I hereby certify that I will ensure that its requirements and conditions are fulfilled.

_____
Company Name

Contractor – Project Manager	Contractor – Field Supervisor
Date	Date

Please submit a signed copy of this Acknowledgement to the OCIP Administrator
c/o Amy Rudzik, Fax: 844-774-3400, prior to commencing work.

Project Safety and Health Management Plan

Table of Contents

1.0 Introduction 3

2.0 General Requirements 4

3.0 Safety Policy Statement 6

4.0 Responsibilities for Safety & Loss Control 7

- General Overview
- Project Manager
- Project Foremen
- Subcontractors and Sub-subcontractors
- Worker's Responsibilities

5.0 Safety Related Meetings and Training 9

6.0 Project Disciplinary/Corrective Procedures 11

7.0 Record-Keeping and Files 12

8.0 Job Site Inspections 13

9.0 Drug and Alcohol-Free Workplace Program 14

10.0 Accident / Injury Management 19

11.0 Workers' Compensation Claims Cooperation 19

12.0 General Safety and Health Policies 20

- Competent Person Requirements
- Personal Protective Equipment
- Fall Prevention
- Excavation and Trenches
- Electrical
- Scaffolds
- Welding and Cutting
- Cranes
- Motor Vehicles and Heavy Equipment
- Coronavirus Disease (COVID-19)

1.0 Introduction

This Safety and Health Management Plan (herein referred to as "Plan") is intended to establish uniform policies and procedures for all Contractors, with the goal of reducing the frequency and severity of accidents. This Plan applies to all Work performed on all CM Regent OCIP Construction Projects as defined by the Contract.

1. Contractor shall implement, maintain and adhere to a written Contractor Safety Program as required by the Bid Documents. Contractor, upon request, shall submit the Contractor Safety Program to the Owner or its representatives prior to commencement of the Work. In the event that the Contractor Safety Program does not comply with the requirements of this Agreement or of the Plan incorporated into this Agreement, the Contractor Safety Program shall be redrafted to comply with this Agreement and with the Plan, whichever provides the highest level of Safety. (The Contractor may, however, incorporate this Plan into their Safety Program for this project by reference.) One or more copies of the written Contractor Safety Program must be maintained on-site for employee review. Before the Contractor or any Subcontractor commences Work, the Contractor or Subcontractor, as applicable, shall make available to employees a copy of the Contractor Safety Program and the Contractor or Subcontractor, as applicable, and shall certify that prior to any employee, or any employee of any Subcontractor, beginning Work on the Project, the employees have been oriented with regards to the written Contractor Safety Program and have been directed by the Contractor or Subcontractor or its representatives to comply with Program requirements.
2. The Contractor, all Subcontractors and Sub-subcontractors shall assume all costs related, but not limited to, Personal Protective Equipment, Drug and Alcohol-Free Workplace Substance Abuse Program (costs for Drug & Alcohol tests, as specified in this plan, shall be the responsibility of the Owner), all training requirements, etc.
3. Compliance with the Plan is a requirement of the Contract. Failure to comply will be considered a breach of Contract, subject to the remedies provided in the Contract including, but not limited to, withholding of progress payments or termination for cause.
4. The Contractor, all Subcontractors and Sub-subcontractors shall immediately correct unsafe conditions. When the Contractor, any Subcontractors or Sub-subcontractor is notified of an unsafe condition they shall immediately correct the unsafe condition.
5. If the Contractor, any Subcontractors or Sub-subcontractor refuses to correct an imminent danger condition, the Owner and/or its representatives is authorized to stop that portion of the Work until the Work can continue in accordance with the requirements of this Plan. The cost to bring the Work activity into compliance shall be incurred by the Contractor, Subcontractors and/or Sub-subcontractors and at no time shall the costs be charged to the Owner.
6. Each Contractor, all Subcontractors and Sub-subcontractors shall be responsible for payment of all fines, damages or other costs resulting from failure to comply with the Plan requirements. The Contractor shall reimburse the Owner for any fines, damages or costs incurred (including the costs of attorneys' fees for defense and appeals) arising out of the Contractor's operations.

2.0 General Requirements

Each Contractor, Subcontractor and Sub-subcontractor shall: (a) be solely responsible for the health, safety and security of employees and others under its control and/or supervision; and (b) comply with the terms and conditions of the Project Safety and Health Management Plan (herein referred to as "Plan") attached hereto and incorporated herein by reference as if fully set forth herein. The Project Manager and Field Supervisor of each Contractor and Subcontractor must execute a copy of the Plan certifying that each will ensure that the requirements of the Plan will be fulfilled. Notwithstanding anything to the contrary that is contained herein or in the Project Safety and Health Management Plan, the Contractor and Subcontractors of all tiers are solely responsible for safety on the job site and with respect to the work and waive all claims against the Owner, the Construction Manager, and/or the Architect based on, arising out of or in any way involving any actual or alleged non-compliance with the Safety and Health Management Plan.

1. Contractor shall conduct its business in a professional manner to prevent the occurrence of incidents that lead to injuries or illnesses and/or equipment and property damage. Safety, health and security requirements for the Work under this Contract shall be administered by the Contractor and all of its Subcontractors and Sub-subcontractors in accordance with the following:

    a. The importance of Safety with respect to all Work shall be recognized and accident prevention shall be an integral part of all planning and operations by the Contractor and its Subcontractors;

    b. Contractor, Subcontractors and Sub-subcontractors shall conduct Work in accordance with: (i) the Occupational Safety and Health Act of 1970 (OSHA) and all additions, amendments and revisions thereto; and (ii) the Plan;

    c. Contractor, Subcontractors and Sub-subcontractors shall follow all applicable federal, state and local laws/regulations pertaining to pollution control, water supply, fire protection, sanitation facilities, waste disposal and other related items;

    d. Contractor, Subcontractors and Sub-subcontractors shall cooperate fully with the Owner and its representatives and all other Contractors and Subcontractors in providing and managing safety, health and security programs with respect to the Work;

    e. Housekeeping shall be observed at all times and waste, debris and garbage shall be removed daily and placed in appropriate waste containers. All materials, tools and equipment shall be stored in a safe and orderly fashion.

    f. Should Owner or its representatives notify Contractor of any safety non-compliance resulting in an unsafe act or improper equipment operation that puts the life and/or safety of Job Site personnel in imminent danger or other persons at risk, the Owner or its representatives shall have the right to immediately stop such Work or acts. Contractor shall correct the hazard or condition within the time specified prior to resuming Work in the area. Nothing in this Contract shall be construed as creating any duty on the part of the Owner to inspect the Work for safety.

2. **Safety Program**

    a. Any Contractor or Subcontractor having a Contract Value with respect to the Work of Fifty Million ($50,000,000) or greater (per contract/bid package) shall provide a dedicated full-time site Safety Representative knowledgeable in the areas of construction safety, health and fire prevention. The full-time Safety Representatives

shall have completed the OSHA 500 Construction and Outreach Training Program, as a minimum. This individual shall have no other collateral duties or job responsibilities and shall have the authority to act as liaison with the Owner and/or its representatives, other Contractors and Subcontractors on all matters related to safety. This individual shall have full authority to ensure safe Work practices and to correct unsafe or hazardous conditions. All other Contractors and Subcontractors shall designate a member of supervision, who may have other duties, as its Safety Representative whose duty shall be the prevention of accidents. The Safety Representative shall have a current (within the last Five (5) Years) OSHA 10 Hour Construction Outreach Training Certificate. The OSHA 10-hour training card shall be available for review upon request.

b. Contractor shall inform the Owner and/or its representatives of any federal or state inspections. Contractor shall provide Owner and/or its representatives with copies of all federal and state inspection reports, citations, penalties, abatement dates, and the like, with respect to the Work or any aspect of the Work under this Contract.

c. The Contractor shall cooperate with the Owner and/or its representatives, who may periodically observe any aspect of the Work and/or the Project Work Site without prior notice.

d. All lay down and storage areas shall be coordinated with the designated Project official prior to set-up of these areas. Contractor shall be responsible for the security of said area(s) and for all material, equipment and tools.

d. Any media contact or responses to media inquiries shall be directed to the Project official designated by the Owner. Contractor and Subcontractor shall not discuss accidents, incidents or other related issues with the media.

f. All employee vehicles shall be restricted to designated parking areas. All parking areas shall be coordinated with the designated Project official.

3. Employee and Visitor Dress Requirements

a. All projects shall enforce a One Hundred Percent (100%) hard hat requirement for all construction areas. All supervisors, employees and visitors shall be required to wear hard hats while on the Project Site.

b. Contractor shall ensure that all workers and visitors wear durable work shoes. At no time are clogs or footwear with large openings, street shoes, tennis shoes or sandals allowed. Under no condition shall employees wear shorts, tank tops and/or sleeveless shirts.

4. **Failure to Comply with Safety Regulations**

    a. Failure to comply with the Contract Safety Requirements shall be deemed to constitute non-compliance with the Contract and may result in remedial action as provided by the Contract.

    b. If Contractor refuses to correct unsafe or unhealthy conditions or acts, the Owner and/or its representatives may take one or more of the following actions:

        i. Instruct the Contractor, Subcontractor or Sub-subcontractor, who shall comply with said instructions, to cease the Work, or a portion thereof, until the condition is brought into compliance with Contract and Safety Requirements;

        ii. Require Contractor, Subcontractor or Sub-subcontractor, who shall comply with said requirement, to replace or supplement its site Safety Representative and/or supervisory personnel, as appropriate;

        iii. Stop payment for the Work being performed; and/or

        iv. Correct the situation using another employee or Contractor and charge Contractor who shall pay for the expenses and costs incurred.

        v. All costs associated with ensuring a safe and healthful Work environment, shall be borne by any non-compliant Contractor or Subcontractor, and costs will be charged to and/or assessed against the non-conforming Contractor or Subcontractor. Contractor, Subcontractor, and Sub-subcontractor shall be responsible for the payment of all fines and/or claims for damages levied against the Owner and/or its representatives for deficiencies relating to the conduct of the Contractor's Work.

3.0 Safety Policy Statement

Objective

The objective of this Plan is to reduce the frequency and severity of accidents on this Project. There are Three (3) sound reasons for this objective:

1. No endeavor is worthy if it should cause human suffering through disabling injury or loss of life.
2. A good safety record reflects the quality of management.
3. Poor accident experience increases cost, and results in a loss of profit.

Policy Statement

The safety of persons and property is of paramount importance to the Owner. This Plan will establish employee safety and health as an integral part of the overall success of this Project.

By Contract, the Contractor, all Subcontractors and Sub-subcontractors on the Project Site shall comply with the requirements of the Federal Occupational Safety and Health Act of 1970 (OSHA) and all additions and revisions thereto, as well as any other applicable federal, state and local requirements and this Plan.

The on-site supervisory personnel are responsible for the actions of those they supervise, for maintaining safe and healthy working conditions in their areas of responsibility, and for strictly enforcing all safety and health policies and regulations. All employees shall comply with these Rules and Regulations.

4.0 Responsibilities

The Contractor, all Subcontractors and Sub-subcontractors shall prevent accidents and are responsible for thorough safety and risk control training and instruction for their employees.

The prevention of accidents and protection of property shall receive management's top priority, support and participation.

General Overview

- Provide a safe environment where employees can perform high quality Work.
- Use Safety Planning as a tool to reduce injury to persons and damage to property.
- Provide inspections to locate and abate unsafe conditions and practices before they result in bodily injury or property loss.
- Protect the public and property adjacent to the Construction Site.
- Educate and Train employees through:
  - New Hire Safety Orientation
  - Weekly Safety meetings
  - Task-Specific Safety Training, (i.e., hazard communications (HAZCOM), fall protection, construction safety practices, trenching safety, confined space entry, etc.)
- Mandatory Personal Protective Equipment (PPE) Programs.
- Injury reporting and record keeping to maintain an up-to-date accident experience and trends analysis.
- Using accident investigation information to abate deficiencies and eliminate any additional losses.
- Return-To-Work (Modified Duty) Programs.
- Site-Wide One Hundred Per Cent (100%) Six (6) Foot Fall Protection Policy including steel erection. (See scaffold section for erection/dismantling fall protection requirements).
- Drug and Alcohol-Free Work Place Program.

Contractor's Project Manager

The Contractor's Project Manager shall be responsible for:

- Promoting Total Job Safety with all employees and visitors;
- Accepting full and complete responsibility for the implementation and execution of the Plan on-site;
- Monitoring Contractor adherence to Plan Requirements; and
- Assisting in accident investigations with the Program's Safety Representative;
- Send in a signed and dated copy of the Confirmation of this Project Safety & Health Management Plan Project Requirements to the OCIP Administrator at the beginning of the Project.

Contractor's Project Foremen

The Contractor's Project Foreman shall be responsible for:

- Setting a good safety example for workers;
- Using Pre-Task Planning, instructing workers on Safe Work Practices and Methods to prevent injury, damage to property and loss of productive time;
- Supplying and enforcing the use of Personal Protective Equipment (PPE);
- Familiarizing workers with the Safety Requirements applicable to their Work;
- Holding weekly Tool-Box Safety Meetings with their Work crews;
- Conducting daily Safety Inspections of their Work areas;
- Assisting in accident investigations with the Program's Safety Representative; and
- Assuring that proper first-aid treatment is administered to injured employees.

Contractors, Subcontractors and Sub-subcontractors

All Contractors, Subcontractors and Sub-subcontractors shall have overall responsibility for accident prevention and implementation of this Plan for their personnel.

Each Contractor, Subcontractor and Sub-subcontractor shall designate a member of supervision, who may have other duties, as their Safety Representative in accordance with the Contract Documents. The Safety Representative shall be knowledgeable and responsible for all applicable Safety Standards and site policies. This individual shall have, at a minimum, completed the OSHA 10 Hour Construction Outreach training course within the last Five (5) Years.

The Safety Representative is responsible for performing Construction Safety Inspections and identifying and resolving any safety related concerns pertaining to their Work.

All employees shall be orientated to their company's Contractor Safety Program as well as to the Plan. Documentation of this training (which includes but is not limited to: Attendance roster, date of training and course content) shall be maintained on file.

Each Contractor shall be responsible for providing their Subcontractor's and Sub-subcontractor's Safety Representative with an emergency communication plan for use in emergency response and other safety related communications.

Although many existing hazards may be corrected through informal communications, all corrective actions must be documented.

Worker's Responsibilities

The Workers shall be responsible for:

- Working according to good safety practices as posted, instructed and discussed;
- Complying with the Plan and the Contractor's Safety Program;
- Using all required and provided safety devices;
- Reporting any unsafe situation or act to their supervisor and/or designated Safety Representative immediately;
- Maintaining a clean and safe Work area;
- Performing assigned duties in an alert manner, free of any impairment that may affect safety;
- Following the Site's Safety Program; and
- Reporting injuries immediately to their supervisor.

5.0 Safety Related Meetings and Training

Safety Meetings and Training shall be conducted by the Contractor, all Subcontractors and Sub-subcontractors. The following meetings and training shall be conducted, documented and maintained on file:

- Indoctrination (Orientation) Safety Training
  - All new employees and visitors to the Construction Project shall be properly trained and oriented with regards to the OCIP, hazard recognition, Site-Specific Safety Requirements, emergency procedures, first-aid/medical procedures, assigned Panel of Physicians, etc.
- "Tool Box" Safety Meetings
  - The Contractor, all Subcontractors and Sub-subcontractors shall conduct weekly Safety Training Meetings with all employees working on the Construction Project. This training shall be conducted by a supervisor or foremen.
  - The meetings shall cover any Hazardous Work Conditions, unsafe Work practices that have been identified, safe working practices, review of accidents and near-misses that have occurred on the Construction Project and safety rules and regulations.

- This training shall be documented to include names of employees attending the training and an outline of all topics discussed.

➢ Coordination Meetings

- Safety shall have a portion of the agenda in all Coordination Meetings for discussion of previous safety issues and to discuss the current week's activities. Minutes from the Coordination Meetings shall reflect safety items discussed and any proposed resolution to issues.

➢ Periodic Safety Management Meetings

- Upon request by the Owner or its representatives, a Safety Management Meeting will be held periodically on the Construction Project to review on-going safety issues. The Contractor's, all Subcontractor's and Sub-subcontractor's Safety Representatives, Project Managers and Project Safety Representatives shall attend these meetings.
- If the Contractor, any Subcontractor or Sub-subcontractor has a lost-time injury, a representative of the respective company shall explain at the next Safety Meeting:
  - Why the accident occurred?
  - What corrective measures have been taken to prevent similar injuries from occurring?
  - What the claim status of the injured employee is?
  - What, if any, alternative (modified duty) work has been provided?

➢ Pre-Shift Hazard Recognition Training

- The Contractor, all Subcontractors and Sub-subcontractors shall hold Pre-Shift Hazard Recognition Training with each work crew working under the following conditions:
  - In and/or around occupied school facilities – Special hazards associated with occupied facilities – Separation and isolation of Construction activities from school activities.
  - One Hundred Percent (100%) Fall Protection
  - Scaffold Erection and Dismantling
  - Crane and all Material Hoisting Operations
  - Excavation and Trenching Operations
  - Non-Routine Work Operations, i.e. Emergency Procedures, Industrial Hygiene, etc.
  - Confined Space Operations
  - Demolition – written engineering survey to be completed and submitted to the Construction Manager or Owner representative prior to demolition activities.

6.0 Project Disciplinary / Corrective Procedures

General Statement: The Project Disciplinary/Corrective Procedures are intended to encourage compliance with the requirements of OSHA, other applicable federal, state and local requirement, and this Plan. Workers performing Work in an unsafe manner shall be subject to counseling, training, discipline, transfer or termination.

Responsibilities of Contractor and Subcontractors: Each Contractor and Subcontractor shall respond to each work injury and known unsafe act as follows:

1. **Investigation.** The Contractor or Subcontractor, as applicable, shall conduct a proper investigation to determine: (a) the nature of the unsafe act; (b) the reasons the unsafe act occurred; and (c) the identity of the individual(s) who engaged in or was responsible for the unsafe act. With respect to any individual employee or representative who was identified as having engaged in or being responsible for an unsafe act, the following information shall be among the information reviewed and considered:
    a. The individual's past training and experience as is relevant to the unsafe act committed;
    b. The individual's prior disciplinary record;
    c. The individual's prior record with respect to: (i) engaging in or allowing unsafe acts, and (ii) following instructions and directions; and
    d. The individual's degree of culpability.
2. **Prevention.** The Contractor or Subcontractor, as applicable, shall take action that is reasonably calculated to ensure that:
    a. The unsafe act will not be repeated; and
    b. That the individual(s) responsible for engaging in or allowing the unsafe act to occur will not engage in or allow unsafe acts to occur in the future.
3. **Disciplinary/Corrective Options.** The options available to Contractors and Subcontractors when taking action that is reasonably calculated to ensure that the unsafe acts will not be repeated and that responsible individuals will not engage in or allow unsafe acts to occur include:
    a. Additional training for workers in general and/or to the responsible individual in particular;
    b. Job performance counseling of the responsible individual(s);
    c. Verbal Warning (which shall be documented);
    d. Written Warning;
    e. Suspension from Work without pay;
    f. Transfer off the Project; and
    g. Discharge from employment.
4. **Guiding Principles.** Contractors and Subcontractors shall decide which option(s) to exercise in accordance with the following guiding principles:

a. Nothing in this Plan shall be construed to require any Contractor or Subcontractor to violate the terms or conditions of any applicable law, collective bargaining agreement or employment contract;

b. If any individual engages in a repeated unsafe act(s), a repeated violation(s) of the Contract, a repeated violation(s) of OSHA requirements, or a repeated violation(s) of this Plan, the actions taken by the Contractor or Subcontractor, as applicable, shall be progressive in severity and consequence;

c. Nothing in this Plan requires progressive discipline as a precondition to any suspension, transfer or discharge from employment and the Contractor or Subcontractor may impose a suspension, transfer or discharge for safety violations if it so chooses without having engaged in prior progressive discipline;

d. It is expected that individuals who engage in or who are responsible for any unmitigated life-threatening conduct or for willful disregard to the safety requirements of this Plan shall be subject to immediate discharge or permanent transfer off the Project.

5. **Follow Up.** Contractors and Subcontractors shall take follow up action to ensure that the actions taken are effective. If it is observed that the actions originally taken have not been effective to prevent a repeat of the particular unsafe act or to prevent the particular individual(s) from engaging in that or other unsafe acts, the Contractor or Subcontractor, as applicable, shall take more aggressive disciplinary and corrective action.

6. **Documentation.**

   a. Each Contractor and Subcontractor shall fully document the following:

      i Known unsafe acts;

      ii Investigation undertaken in accordance with these procedures;

      iii Disciplinary and/or corrective action taken;

      iv Rationale for choosing the particular action taken;

      v Follow up action that is planned;

      vi Follow up action that is taken; and

      vii Results of the follow up action.

   b. The documentation shall be maintained in an organized manner by each Contractor or Subcontractor as applicable and in accordance with the Record-Keeping requirements of this Plan. Records of discipline, job counseling and training shall be placed in the personnel file of the employee. Copies of the documentation shall be provided to the Owner and/or its representatives.

7.0 Recordkeeping and Files

The Contractor, all Subcontractors and Sub-subcontractors shall maintain a master or central file for safety and health related documentation on the Job Site. Files shall be maintained in such a manner that distinguishes each Contractor and their Subcontractors and Sub-subcontractors.

The Owner and/or its representatives shall have the right to review all documentation at any time upon request. The Contractor shall give full cooperation during these reviews.

The following documentation shall be in the Safety Files:

- The Contractor Safety Plan.
- Hazard Communication Program, including current Safety Data Sheets (SDS).
- Site Emergency Plans.
- All required safety & health permits.
- Weekly Tool Box/Tailgate Safety Meeting reports – including meeting topic(s) and employee attendance/sign-up sheets.
- Specific job hazard worker training.
- Job Site Safety Inspection reports – including documentation of corrective measures for closure.
- Equipment inspection reports.
- Crane inspection reports – daily and monthly (annual certification reports required prior to equipment operation).
- Employee orientation training records.
- Accident investigation reports, including near misses.
- Job Hazard Analysis.
- Competent person qualifications.
- Written Safety Violations.
- Written engineering survey for demolition.

8.0 Job Site Inspections

Inspections

Daily Safety and Health Inspections shall be continually conducted by the Contractor, all Subcontractors and Sub-subcontractors for each of their respective work areas on the Job Site. Documentation of all identified and corrected deficiencies shall be maintained on file.

Corrective Measures

Corrective measures to abate all deficiencies shall be completed immediately if life-threatening/serious conditions exist or no later than the end of the working shift for non-life threatening/serious conditions. All work shall be stopped until imminent danger hazards have been abated. Documentation of these corrective measures shall be provided to the Program's Safety Representative.

If a deficiency can not be abated within the same shift, a letter shall be provided to the Owner or its representatives outlining the reason(s) why and the step(s) taken as an interim measure to control the potential hazard.

Non-Abatement

If Contractor, Subcontractor or Sub-subcontractor fails to make corrections to identified deficiencies in a timely manner, the Owner or its representatives will*:*

- Notify the Contractor in writing to take prompt corrective action to eliminate construction safety and health concerns. Written notification will describe specific contract or code violations;
- Resolve outstanding construction safety issues and maintain documentation of corrective actions;
- Report in writing to the Contractor, the name(s) of the individual(s) and their supervisor(s) who are observed to violate Construction Safety Requirements, with copies to the Project File. If necessary, the Owner or its representatives may require the Contractor to remove these individual(s) and/or their supervisor(s) from the Job Site.

Stoppage of the Work

The Owner and/or its representatives shall be authorized to order, at the Contractor's expense, a stoppage of the Work until unsafe conditions are abated for imminent danger. It shall be communicated that all employees have a responsibility and are authorized to "stop work" on any activity or situation they believe presents a danger to themselves or a coworker, without fear of retribution.

9.0 Drug and Alcohol-Free Workplace Program

General Statement: The Owner is committed to maintaining a drug and alcohol-free workplace. The Owner has a vital interest in maintaining safe, healthful and efficient working conditions. Alcohol and illegal drug use or possession, pose a serious threat to workplace safety and health. Impairment from alcohol and the use and possession of illegal drugs pose a danger. The costs associated with implementing the Drug and Alcohol-Free Workplace Program, (herein referred to as "Program") shall be the responsibility of the Contractor, Subcontractor or Sub-subcontractor, as applicable. Costs for Drug & Alcohol tests, as specified in this plan, shall be the responsibility of the Owner.

Responsibilities of Contractor and Subcontractors: Contractors and subcontractors shall adopt, implement and enforce drug and alcohol-free workplace programs that comply with the following minimum conditions:

1. Employee Prohibitions

    a. No covered employee shall report for duty or remain on duty (i) while having an alcohol concentration of 0.04 or greater; (ii) while possessing alcohol; (iii) while using alcohol; or (iv) within Four (4) Hours after using alcohol.

    b. No covered employee shall report for duty or remain on duty when the employee uses any controlled substance (except when the use is pursuant to the written instructions or prescription of a physician who has advised the employee that the substance does not adversely affect the employee's ability to work safely) or tests positive for controlled substances.

    c. No covered employee required to take a post-accident alcohol test under this program shall use alcohol for Eight (8) Hours following the accident or until he or she undergoes a post-accident alcohol test, whichever first occurs.

    d. No covered employee shall refuse to submit to a post-accident alcohol or controlled substances test required under this program or a reasonable suspicion alcohol or controlled substances test required by this program, or a follow-up alcohol or controlled substances test required under this program.

2. Employee Duties

    a. Covered employees shall comply with all mandates and prohibitions contained in this Program.

    b. Covered employees shall cooperate fully with all required testing and shall promptly report to all testing as directed.

    c. Covered employees are required to notify the Contractor or Subcontractor as applicable if they are taking any therapeutic drugs and shall supply a written certification on a form provided by the Contractor or Subcontractor from the physician prescribing the drug(s) that the substance(s) will not adversely affect the employee's ability to work safely and to comply with the safety requirements on the job.

3. Consequences of Covered Employees Engaging in Substance Use-Related Conduct.

    a. Consistent with contractual, legal and constitutional requirements, a determination shall be made by the Contractor or Subcontractor, as applicable, as to the appropriate disciplinary action, if any, to be imposed upon any covered employee who violates any of the prohibitions or mandates of this Program. Nothing in this Program shall be construed to limit the authority of any Contractor or Subcontractor to impose discipline, including discharge, as it shall determine so long as the minimums set forth in this Program are satisfied. Unless prohibited by law, contract or collective bargaining agreement, any employee who engages in any of the following conduct shall not be permitted access to the Construction Project and shall not be permitted to engage in any of the Work:

        i Fails a drug test;

        ii Possesses illegal drugs;

        iii Refuses to submit to a drug or alcohol test;

iv Is in possession of alcohol on the Work Site; or

v Is convicted or pleads guilty or *nolo contendere* of illegal drug use, possession or trafficking.

b. Any covered employee tested under this Program who is found to have an alcohol concentration of 0.02 or greater but less than 0.04 shall be suspended without pay at least until the start of the employee's next regularly scheduled duty period that is at least Twenty-Four (24) Hours following the administration of the test.

c. Any covered employee: (i) who reports or remains on duty while having an alcohol concentration of 0.04 or greater, possessing alcohol, using alcohol or having used alcohol within Four (4) Hours of reporting to Work; or (ii) who reports or remains on duty when the employee uses or has used any controlled substance (except when the use is pursuant to the written instructions or prescription of a physician who has advised the employee that the substance does not adversely affect the employee's ability to safely Work and the employee has so advised the Contractor or Subcontractor) or tests positive for controlled substances; or (iii) who consumes alcohol in contravention of a post-accident alcohol test requirement or refuses to submit to any drug or alcohol test required under this Program, and who is not to be discharged from employment, shall be suspended without pay and shall not be reinstated until the following requirements have been met:

i Employee has been advised of the resources available to the employee in evaluating and resolving problems associated with the misuse of alcohol and the use of controlled substances, including the names, addresses and telephone numbers of substance abuse professionals and counseling and treatment programs; and

ii Employee has been evaluated by a substance abuse professional who shall determine what assistance, if any, the employee needs in resolving problems associated with alcohol misuse and controlled substances use; and

iii Employee has undergone a return-to-work alcohol test with a result indicating an alcohol concentration of less than 0.02 if the conduct involved alcohol, or a controlled substance test with a verified negative result if the conduct involved a controlled substance; and

iv If the employee has been identified as needing assistance in resolving problems associated with alcohol misuse or controlled substances use, the employee shall be evaluated by a substance abuse professional to determine that the employee has properly followed a rehabilitation program as prescribed.

4. Mandatory Drug and Alcohol Testing. Contractors and Subcontractors shall, as part of this Program, adhere to the following Post-Accident, Reasonable Suspicion, Return-to-Work and Follow-Up drug and alcohol testing of covered employees (costs for Drug & Alcohol tests, as specified in this plan, shall be the responsibility of the Owner):

a. Post-Accident Testing. As soon as practical following an accident in connection with the Work involving any personal injury of the employee or of another requiring medical attention or first aid, or any property damage greater than One Thousand Dollars ($1,000), the employee shall be tested for alcohol and controlled substances.

i An employee who is subject to post-accident testing under this policy shall remain readily available for such testing or may deemed by the Contractor or Subcontractor, as applicable, to have refused to submit to testing;

ii If a post-accident alcohol test is not administered within Two (2) Hours following the accident, the Contractor or Subcontractor as applicable, shall prepare and maintain a record stating the reasons the test was not promptly administered. If the test is not administered within Eight (8) Hours following the accident, attempt to administer the alcohol test shall cease and the Contractor or Subcontractor, as applicable, shall prepare and maintain a record setting forth why testing was not performed

iii If a post-accident controlled substances test is not administered within Thirty-Two (32) Hours following the accident, attempts to administer the test shall cease and the Contractor or Subcontractor, as applicable, shall prepare and maintain a record stating the reasons why the test was not administered within the required time.

iv A breath or blood test for the use of alcohol or a urine test for the use of controlled substance conducted by federal, state or local officials or policy having authority to conduct such testing shall be considered to meet the requirements of this Program if the results will be turned over to the Contractor or Subcontractor.

b. Reasonable Suspicion Testing. A covered employee shall be required to submit to an alcohol and/or controlled substances test when the Contractor or Subcontractor, as applicable, has reasonable suspicion that the employee is using or has used alcohol or controlled substances in violation of the prohibitions or mandates of this Program.

i The determination that reasonable suspicion exists to require an employee to undergo testing must be based on specific, contemporaneous, articulable observations concerning the appearance, behavior, speech or body odors of the employee. The observations may include indications of the chronic and withdrawal effects of controlled substances. Reasonable suspicion as to alcohol use may be based only on observations made while the employee is working or just before the employee begins Work or just after the employee stops working.

ii The Contractor and Subcontractors shall designate individuals who shall have obtained necessary training that covers the physical, behavioral, speech and performance indicators of probable alcohol misuse and use of controlled substances. Only those so trained are permitted to make the determination that can lead to Reasonable Suspicion Testing.

iii Reasonable Suspicion Testing may not be performed by the individual who made the determination that there was reasonable suspicion for testing.

iv A written record shall be prepared and maintained setting forth the basis and observations for the reasonable suspicion leading to the testing. With respect to suspicion related to controlled substances, such record shall be made and signed by the individual who made the observation within Twenty-Four (24) Hours of the observed behavior or before the results of the controlled substances test are released, whichever is earlier.

v Reasonable Suspicion Alcohol Testing shall be required while the employee is working, just before the employee begins work, or just after the employee stops working. If an alcohol test is not administered within Two (2) Hours following the determination that reasonable suspicion exists, the Contractor or Subcontractor

shall prepare and maintain a record stating the reasons the test was not promptly administered. If the test is not administered within Eight (8) Hours following the determination that reasonable suspicion exists, attempts to administer the alcohol test shall cease and the Contractor or Subcontractor, as applicable, shall prepare and maintain a record setting forth the reasons the test was not administered. Notwithstanding the absence of a reasonable suspicion alcohol test, where there was reasonable suspicion of alcohol use, the employee shall not be permitted to work until:

(1) An alcohol test is administered and the employee's alcohol concentration measures to less than 0.02; or

(2) Twenty-Four (24) Hours have elapsed following the determination of reasonable suspicion.

c. Return-to-Work Testing. No employee may return to work after engaging in conduct prohibited by this Program until after he or she has, as appropriate, undergone an alcohol test with a result indicating an alcohol concentration of less than 0.02 or a controlled substances test with a result indicating a verified negative result for controlled substance use.

d. Follow-Up Testing. Any employee who is in need of assistance in resolving problems associated with alcohol misuse and/or use of controlled substances shall be subject to unannounced Follow-up Testing as directed by a substance abuse professional. Follow-up Testing shall be conducted only when the employee is working, just before the employee begins work, or just after the employee has stopped working.

5. Miscellaneous

a. A "covered employee" under this program shall mean any person who is an employee of the Contractor or any Subcontractor and who engages in any Work that is subject to the safety requirements of the Contract or this Plan and any employee of any Contractor or any Subcontractor who operates a commercial vehicle as defined by law in connection with any of the Work.

b. The means, manner and methods of the testing procedures for alcohol and substances under this Program shall be in accordance with the procedures set forth in Title 49, Part 40 of the Code of Federal Regulations, which, by this reference, are hereby incorporated herein by reference as if fully set forth herein. Without intending to limit the generality of the foregoing requirement, preparation for testing, specimen collection procedures, laboratory personnel requirements, laboratory analysis procedures, quality assurance and quality control procedures, reporting and review of results procedures, protection of employee records procedures, individual access to test and laboratory results, use of certified laboratory requirements, breath alcohol technician requirements, breath alcohol device requirements, quality assurance plans, procedures for confirmation of tests, refusal to test and uncompleted test procedures, inability to provide an adequate amount of breath, invalid test procedures, etc., as governed by 49 CFR, Part 40, shall all be implemented by Contractors and Subcontractors with respect to any drug or alcohol test administered in accordance with this Program.

c. Work Related Injuries. Contractors and Subcontractors shall require Post-Accident Testing in accordance with the terms and conditions of this Program in the event of any accident that results in a work related accident. The Post-Accident Testing may be arranged by the Contractor or Subcontractor or may be arranged by the OCIP Workers' Compensation carrier. In either event, the procedures contained in 49 CFR,

Part 40, shall be followed.

d. Employee Training. Each Contractor and Subcontractor shall require that all employees are trained and periodically retrained in the requirements of the Drug and Alcohol-Free Workplace Program. This training shall be properly documented.

10.0 Accident/Injury Management

Accident Reporting

All accidents resulting in employee injury, property damage, or involving the public shall be reported immediately to the project officials in accordance with the claims reporting instructions provided by the OCIP Insurance Administrator. All accidents resulting in injuries or illnesses shall be thoroughly investigated by the ***injured worker's supervisor***.

The Contractor shall complete an Accident Investigation Report for all accidents resulting in employee injury, property damage, public involvement or near miss incidents. All Contractors shall cooperate with the Owner and its representatives in the investigation, analysis and defense of any claim, accident, occurrence or insured loss.

Accident Investigation

A formal written "Accident Investigation Report" and "First Report of Injury" shall be completed by the end of the working day/shift of the accident. Identification and review of accident causes shall be completed, identifying corrective actions, persons responsible for corrective actions and date of completion shall be established. Follow-up documentation verifying corrective action shall be required.

Copies of all accident investigation documents shall be maintained on file.

11.0 Workers Compensation Claims Cooperation

General Statement

In the event of any work related injury of any employee of any Contractor or Subcontractor, the Contractor or Subcontractor, as applicable, shall cooperate with the Workers' Compensation insurer, or its representatives, to reduce the costs of the administration of the claim by the insurer, to ensure that the claim is properly administered, and to return the employee back to work as soon as possible.

Responsibilities of Contractor and Subcontractors

Contractors and Subcontractors shall adopt, implement and enforce a Workers' Compensation Program that complies with the following minimum conditions:

1. **Compliance with Posting and Notice Requirements**. Each Contractor and Subcontractor shall comply with all posting and notice requirements imposed by Pennsylvania's Workers' Compensation Act. Contractors and Subcontractors shall maintain documentation proving that they have complied with these requirements.
2. **Posting and Designation of Physicians**. In the event that the OCIP Workers' Compensation insurer has provided a list of designated physicians to the Contractor and/or Subcontractor, the Contractor and Subcontractor shall properly post and provide notice of the designated physicians to employees in accordance with the requirements of the Workers' Compensation Act. Contractors and Subcontractors shall maintain documentation proving that they have complied with these requirements. Where a designated physician panel is in place, Contractors and Subcontractors shall take action to ensure that injured employees receive treatment from the designated physicians in accordance with the law.
3. **Notice of Workers' Compensation Injuries**. Contractors and Subcontractors shall receive reports of occupational injuries and diseases in accordance with the terms and conditions of the Workers' Compensation Act and shall promptly complete and file the necessary forms and reports with the Commonwealth and the OCIP insurer or its representative.
4. **Participation in Claims Meetings**. Contractors and Subcontractors shall participate in claims review meetings when and if scheduled by the OCIP Workers' Compensation insurer or its representative.
5. **Return-to-Work Programs**. Contractors and Subcontractors shall cooperate with the OCIP Workers' Compensation insurer or its representative to return injured employees to Work as soon as possible consistent with their medical capabilities. Contractors and Subcontractors shall consider and offer modified Work to employees when such Work is available or can reasonably be made available.
6. **Litigation Cooperation**. In the event that there is any litigation growing out of a -Work-related injury, each Contractor or Subcontractor, as applicable, shall cooperate with the OCIP insurer, its representatives and attorneys, in the defense of the claim and shall make necessary evidence and witnesses available for hearing preparation and testimony.
7. **Nothing in this Plan shall be construed as a requirement that any Contractor or Subcontractor take any action that is in violation of law, any applicable collective bargaining agreement or contract.**

12.0 General Safety and Health Policies

Policies outlined are for the health and safety of all contractors, representatives and owners during the construction activity. It is the responsibility of all contractors to adhere to all federal, state and local laws in regard to health and safety of employees. Any contractor/employee who willfully refuses to follow policies may be subject to disciplinary action which may include immediate removal from the Job Site.

Competent Person Requirements

The Contractor, all Subcontractors and Sub-subcontractors shall develop and maintain documentation identifying employee(s) designated as a competent person(s). The qualifications for Competent Persons are identified in the Subpart of OSHA 29 CFR 1926. NOTE: Various subparts of OSHA have interpretations as to the qualifications and training required to be designated as a Competent Person (i.e., Subpart P – Excavations; Subpart L – Scaffolding; etc.)

Personal Protective Equipment

All employees shall use protective equipment prescribed by federal, state, and local laws and by this Plan to control hazards or other exposure to illness or injury. **Any employee who willfully refuses to use prescribed protective equipment designed to protect them or willfully damages such equipment shall be subject to disciplinary action which may include immediate removal from the Job Site.**

Eye and Face Protection:

Contractors, Subcontractors and Sub-subcontractors shall provide, maintain and manage eye and face protection for their employees in accordance with OSHA Construction Standards 29 CFR 1926.102.

All Construction workers and visitors are required to wear 100% eye protection which meet ANSI Z 87.1 2015 at all times while on the Construction Site.

Only clear safety glasses shall be worn inside any building(s).

Head Protection:

All Construction workers and visitors shall wear hard hats which meet ANSI Z 89.1-1986, One Hundred Percent (100%) of the time while on the Construction Site. Hard hats should display the company decal where the employee works.

All delivery personnel, vendors and visitors shall wear approved hard hats while on the Construction Site.

Hearing Protection:

All Work areas identified as high noise exposure shall be properly posted to warn employees of the exposure.

Appropriate hearing protection shall be worn in Work areas where noise levels are 85 dBA or greater.

Respiratory Protection:

Contractors, whose Work activities warrant that employees wear respiratory protection, shall establish and implement a Respiratory Protection Program. The Program shall meet the requirements set forth in 29 CFR 1926.134.

Foot Protection:

All personnel on the Construction Site shall wear leather hard-soled work boots. No one is permitted to wear sneakers (including ANSI approved), tennis shoes or athletic shoes of any type, sandals, high

heels or open toed shoes on the Construction Site.

Clothing:

Suitable clothing for Construction Work shall be worn on the Construction Site. Shirts with sleeves at least t-shirt (4 inches in length) and full-length pants shall be required. Polyester or similar material is not allowed. Shorts, sweat pants or tank-tops are not allowed. High visibility clothing and/or vests shall be worn at all times including indoor and outdoor activities. Any work involving equipment operations, employees must wear high visibility ANSI Class 2 vest.

Fall Prevention

The Fall Prevention Policy is based on the following observations:

- All fall hazards can be eliminated, prevented and/or controlled.
- To control fall hazards is morally responsible, good business and cost effective.
- The establishment and implementation of a Fall Prevention Program is the most effective way to provide a continuous process to identify, evaluate and control fall hazards.

No person/employee shall be exposed to a fall hazard from any elevation greater than Six (6) Feet. In addition, all other construction activities that involve fall protection/prevention shall be performed in accordance with 29 CFR 1926, Subpart M:

- Employees exposed to a fall distance of Six (6) Feet or more (no exceptions), or less where the distance has a likelihood of a serious or fatal injury, shall be protected by the means of a Fall Protection System.
- Fall prevention controls shall be based on the principle that engineering and design techniques for the elimination and prevention of fall hazards shall be utilized above and beyond the use of Personal Fall Protection Equipment. When it is not feasible to provide fall prevention controls, workers exposed to falls shall be equipped with:
  - Only full-body harnesses and Lanyards with shock absorbers with locking snap-hooks. Body Belts are not permitted on the Project. All Personal Fall Protection Equipment shall be compatible, and all manufacturers equipment guidelines shall be understood and followed.
  - Appropriate anchorage points, capable of supporting Five Thousand (5,000) Pounds per worker attached shall be properly installed.
- Guardrails systems shall comply with the following; top rail 42" (+/- 3") above the walking/working surface. It shall be able to withstand, without failure, a force of 200 pounds applied in any outward or downward direction. Mid-rails, when used, shall be installed midway between the upper surface of the top rail and the walking/working surface. It shall be able to withstand, without failure, a force of 150 pounds applied in any outward or downward direction.
- Contractors performing structural erection activities (such as precast concrete and **steel erection**) shall provide upon request a "Task Specific Fall Protection Plan" which complies with the **Six (6) Foot Fall Protection Requirement**.
- Contractors performing roofing work/activity shall provide upon request a "Site Specific Fall Protection Plan" which complies with 29 CFR 1926, subpart M. All

fall protection means must be evaluated prior to use of safety monitoring systems. **Safety monitoring systems shall be utilized as a last resort.** All Safety monitors must be distinguishable and have appropriate training according to OSHA.

- Ladders (straight, extension & step) shall be used only for employee access and short duration miscellaneous light Work where 3-point contact with the ladder can be maintained. If ladders are to be used for performing long duration heavy Work at heights Six (6) Feet and greater (or any height where the likelihood of a serious or fatal injury exists), the fall hazards shall be controlled through the use of fall protection.

Excavations and Trenches

Excavations shall be performed in accordance with 29 CFR 1926, Subpart P:

- A safe means of access and egress shall be provided for employees from excavations and trenches regardless of their depth at intervals that provide no more than Twenty-Five (25) Feet of lateral travel.
- A Competent Person shall be present anytime excavation Work is performed. The Competent Person shall inspect each excavation before the start of each shift and as conditions change (rain run-off, seeping water, freezing/thawing conditions, vibration, atmospheric conditions, etc.). All inspections shall be documented and maintained on file.
- All soils shall be classified as type "C" until the Competent Person can demonstrate the soil can be reclassified as another type, using acceptable soil analysis practices.
- All employees shall be protected from cave-ins by means of benching, sloping and/or shoring systems, in accordance with 29 CFR 1926, Subpart P.
- All open excavations and trenches shall be barricaded or adequately guarded at all times with highly visible material.
- Equipment, material and spoil piles shall not be placed closer than Two (2) Feet from the excavation or trench edge.
- Atmospheric testing shall be conducted and completed in excavations and trenches where possible hazardous condition exists prior to employees entering.

Electrical

Electrical Work shall be performed in accordance with 29 CFR 1926, Subpart K:

- Only qualified electricians familiar with code requirements shall be allowed to perform electrical Work.

- Extension cords used with portable electrical tools and appliances shall be heavy duty and of the three-wire type. Extension cords shall be at least 12 gauge designed for hard or extra-hard usage types S, ST, SO and STO. Cords shall be covered, elevated or otherwise protected from damage which would create a hazard to

Construction Site Personnel.

- Extension cords shall be hung overhead and/or positioned as to minimize slip, trip and fall hazards.
- Electrical cords and equipment shall be visually inspected before each shift for external defects. All damaged and defective cords shall be removed from service immediately (this includes cords with the ground prong missing). Cords shall be repaired with approved heat-shrink methods, electrical tape is not permitted.
- All temporary electrical tools, cords and equipment shall be properly protected by Ground Fault Circuit Interrupters (GFCI). All portable generators shall have properly functioning GFCI outlets. GFCI receptacles shall be tested monthly with a multi-range GFCI tester (the tests shall be documented) to insure the GFCI is properly functioning and protecting the worker.
- Electrical equipment or machinery shall be de-energized and rendered inoperative by the electrician performing Work on the system. Any company performing Work on electrical equipment shall develop a "task-specific" lockout/tagout safety plan. Lockout/Tagout shall be performed in accordance with 29 CFR 1910.147. The failure to follow lockout/tagout procedures will result in immediate removal from the Project.

Scaffolds

Scaffold Work shall be performed in accordance with 29 CFR 1926, Subpart L:

- The contractor shall have a competent person determine the feasibility and safety of providing fall protection for employees erecting or dismantling supported scaffolds. Employers are required to provide fall protection for employees erecting or dismantling supported scaffolds where the installation and use of such protection is feasible and does not create a greater hazard.
    - Lean-to scaffolds and makeshift platforms shall be prohibited.
    - Scaffolds shall not be used for storage of materials except material currently being used.
    - All scaffolds shall be adequately designed to carry, without failure, Four (4) Times the maximum intended load. At no time shall any scaffold be overloaded.
    - All scaffolds shall be maintained in safe condition. Scaffolds damaged or weakened, from any cause, shall be immediately removed from service.
    - Scaffolding more than Six (6) Feet above the working surface shall have standard guardrails and toe boards properly installed.
    - Each Contractor working with scaffolds shall designate, in writing, the name of their designated Competent Person for erection, dismantling, altering and moving of scaffolds.
    - Scaffolds shall be inspected prior to each shift by the designated Competent Person.
    - Proper access shall be provided for all employees to working areas. Employees shall not climb on cross-bracing to access scaffold.
    - Scaffolds shall be erected on sound, rigid surfaces. Base-plates and mud-sills shall be used with all scaffolds. Unstable objects such as brick, block, etc. shall not be used to support scaffolds.

Welding and Cutting

Welding and Cutting Work shall be performed in accordance with 29 CFR 1926, Subpart J:

- Welding leads and cutting hoses shall be kept clear of walkways and stairways.
- Flash arrestors shall be installed on both oxygen and acetylene hoses at the regulator connection.
- All welders shall wear approved eye and head protection when welding. All personnel assisting the welder shall also wear approved protective eye protection.
- Prior to welding or cutting a "20-ABC" rated fire extinguisher shall be within easy reach of the worker. A fire watch shall be stationed at all locations where sparks and/or flames may fall to a lower floor/work area or to another side of a wall.
- A suitable cylinder truck, with chain, shall be used to keep cylinders from being knocked over while in use.
- Flash arrestors shall be installed on both oxygen and acetylene hoses at regulator connection.
- Spent welding rods shall be picked up and disposed of daily.
- When practical, all welding and cutting operations shall be shielded by non-combustible or flame-proof screens.
- Oxygen and acetylene cylinders shall not be stored inside buildings.
- Rubber boot protectors shall be provided on all welding leads where they make connections at the welding machine.

Cranes

Crane Operations shall be in accordance with 29 CFR 1926, Subpart CC:

The following requirements shall be followed by the Contractor and all tiered Subcontractors for all cranes entering the Construction Area:

- All hydraulic and lattice boom cranes operating on the Construction Site shall be equipped with a functioning "anti-two blocking" device.
- The operator shall know the weight of every suspended load, regardless of size.
- All cranes shall have an annual inspection (completed and certified by a nationally recognized crane inspection organization) and available upon request.

All crane operators shall be qualified prior to operating any crane on the Job Site:

- Operators shall meet the requirements of 29 CFR 1926, Subpart CC.
- An up-to-date résumé detailing the operator's qualifications (i.e., years of experience, pervious jobs worked on, etc.) Shall be maintained in the Contractor's and/or any Subcontractors and Sub-subcontractor’s files at the Job Site.

- Before any operator is allowed to operate a crane on the Construction Site, the Contractor and/or Subcontractors and Sub-subcontractors shall have the operator perform a functional operation appraisal to ensure the operator is qualified. Employer must ensure all operators are qualified on the make, model and configuration of the crane. This shall be documented and maintained on file in accordance with 29 CFR 1926, Subpart CC.
- Operators shall hold a current CCO (Certified Crane Operator) card with the appropriate designation for the type of crane being used, a current Pennsylvania Crane Operators license and current medical certificate.

Cranes shall be inspected for safety-related deficiencies and defective/damaged parts that effect the safe operation of a crane. Cranes shall be immediately removed from service until repairs can be made. All inspections shall be documented. The following inspection criteria shall be followed:

- After set-up and prior to initial lift;
- Before each shift;
- Monthly;
- After every malfunction;
- Manufacturer's inspection guidelines.

Motor Vehicles and Heavy Equipment

Heavy Equipment Work shall be performed in accordance with 29 CFR 1926, Subpart O:

- All employees who operate equipment and vehicles shall have sufficient experience with that particular piece of equipment and shall be trained in the safe operation of that equipment.
- All heavy equipment including: cranes, forklifts, dozers, endloaders, etc. shall have a reverse signal/back-up alarm audible above surrounding background noise.
- High visibility clothing ANSI Class 2 shall be worn at all times.
- No one shall ride in a vehicle or mobile equipment unless they are in a seat (exceptions, if the equipment is designed to be operated while standing up). Riding in the back of pick-up trucks shall not be allowed.
- All motor vehicles and equipment brought on-site shall be thoroughly inspected and shall be in safe operating condition.
- Forklift operators shall have a current training card that should be available for review upon request.

Coronavirus Disease (COVID-19)

All contractors and visitors should follow all CDC, federal, state and local requirements, recommendations and mandates in regard to protocols and practices to minimize the spread and potential infection of COVID-19. Contractors should also follow their own company's COVID-19 Safety Plan as well.

Protocols and practices implemented may include but not limited to:

- Frequently wash your hands with soap and water for at least 20 seconds. When soap and running water are unavailable, use an alcohol-based hand rub with at least 60% alcohol.
- Avoid touching your eyes, nose or mouth with unwashed hands.
- Follow appropriate respiratory etiquette, which includes covering for coughs and sneezes
- Don appropriate face coverings
- Maintain social distancing

In addition, employees must familiarize themselves with the symptoms of COVID-19, which may include but not limited to:

- Coughing
- Fever
- Shortness of breath, difficulty breathing and,
- Early symptoms such as chills, body aches, sore throat, headache, diarrhea, nausea/vomiting and runny nose.

**All employees who exhibit symptoms and/or have been in close contact with someone showing symptoms should notify their employer immediately.

SCHOOL DISTRICT CONSTRUCTION

OWNER CONTROLLED INSURANCE PROGRAM

OCIP or WRAP-UP

CM Regent Insurance Company

Insurance Cost Worksheet

Program Administrator:

Willis Towers Watson
Project Insurance Group
One PPG Place, 10th floor
Pittsburgh, PA 15222

Gary Meinen
412-863-4749

What is an OCIP?

An OCIP is a single insurance program covering specific job site risks of the Owner, Construction Manager, Contractors, and all Subcontractors performing work at the project site. An OCIP program typically excludes coverage for vendors, suppliers, truckers, material men or any other party whose sole function is to deliver materials to or remove materials from the project site.

The coverages provided by the OCIP are Workers' Compensation, General Liability, and Excess Liability for eligible Contractors and Subcontractors. (Builder's Risk will also be provided.) This program extends only to work performed at the designated project site.

Bidding the Work

Bids are to be made "net of insurance" and the Contract will be awarded to the lowest responsible bidder "net of insurance", all as more thoroughly described in the Contract Documents.

Under this approach, Contractors and Subcontractors **must** remove the cost of insurance from the Base Bid price and all alternate prices. The lowest responsible bidder will be determined on a "net of insurance" basis. In other words, the Base Bid is to be identified by the Contractor excluding any cost or expenses for Workers' Compensation, General Liability, Excess Liability, and Builder's Risk Insurance that is provided by the Owner through the OCIP. The Owner will select which alternates it desires and will determine the low bidder based upon the bids without these insurances being provided by the Contractor.

Insurance costs of **both self-performed and subcontracted work** must be removed when developing your bid price for this project.

It is your duty to familiarize yourself with the contract language outlining the coverages provided under the Owner Controlled Insurance Program (OCIP).

It is also your duty to familiarize yourself with the contract language detailing the coverages that you as a Contractor are required to maintain for both off-site and on-site exposures which are not covered under the OCIP.

The insurance coverages and requirements detailed in your Contract are applicable to **both the bidding Contractor all Subcontractors** you intend to employ on this project.

Important Notice

- It is important to remember that the amount deducted as insurance costs associated with your Bid will have a direct impact on the competitiveness of your bid. It is critical that you understand the process and ensure your insurance costs are correctly removed.
- The Worksheet and example below are given as an example of what costs should be removed from your bid price.

CONTRACT INSURANCE COST

Sample Calculations

Assumptions:

- Plumbing work @ $2,000,000
- Payroll @ $600,000
- Subcontract @ $200,000

Contract Insurance Cost Calculation

A. Workers' Compensation Cost (Project Site Payroll Only)

Classification	WC Code	Rate/$100	Estimated Payroll	Premium
Plumbing	663	6.06	$600,000	$36,360
		Totals	$600,000	$36,360

Modifiers*	Rates	
Increased Limits	X 1.019	$37,050
Experience Mod.	X 0.92	$34,087
Scheduled Credit	X 0.95	$32,382
Construction Credit	X 0.78	$25,258
Premium Discount	X 0.88	$22,227
Taxes	X 1.04	$23,116

Total Workers' Compensation Premium @ $23,116

**Refer to your Workers' Compensation policy to determine which factors are applicable.*

B. General Liability (Project Site Payroll/receipts Only)

Classification	GL Rate/$100	Estimated Payroll	Premium
Plumbing	1.20	$600,000	**$7,200**

C. Umbrella/Excess Liability (Project Site Payroll/receipts Only)

Classification	XS Rate/$100	Estimated receipts	Premium
Plumbing	.40	$2,000,000	**$8,000**

E. Subcontractors Insurance Costs

- Request and itemize WC and GL costs from Subcontractors similar to above. (Include a value for all subcontractors)

Contract Insurance Cost

A.	Total Workers' Compensation Premium	$23,116
B.	Total General Liability Premium	7,200
C.	Total Umbrella/Excess Premium	8,000
D.	Allowance for Claim Deductibles	8,000
E.	Subcontractors Premium	7,000
	Total Premiums	$ 53,316
	Overhead (Est. @ 15%)	7,997
	Profit (Est. @ 6%)	3,199
Contract Insurance Cost		**$64,512** *

**In this example, $64,512 is the contract insurance cost.*

CONTRACT INSURANCE COST

Worksheet

A. Workers' Compensation Cost (WC)

Classification	WC Code	Rate/$100	Estimated Payroll	Premium
			$	$
			$	$
			Totals $	$

Modifiers*	Rates	
Increased Limits	X	$
Experience Mod.	X	$
Scheduled Credit	X	$
Construction Credit	X	$
Premium Discount	X	$
Taxes	X	$

Total Workers' Compensation Premium	**$**

**Refer to your Workers' Compensation policy to determine which factors are applicable.*

B. General Liability (GL)

Classification	GL Rate/$100	Estimated Payroll	Premium
		$	$
		$	$
Total General Liability Premium			$

C. Umbrella/Excess Liability (XS)

Classification	GL Rate/$100	Estimated Receipts	Premium
		$	$
		$	$
Total Umbrella/Excess Liability Premium			$

E. Subcontractors Insurance Costs (Itemize Cost for Each Subcontractor use the next page if more than three subcontractors)

Subcontractor	Estimated Contract Amount	Insurance Related Costs
➢		$
➢		$
➢		$
Total Subcontractors Insurance Costs:		**$**

Contract Insurance Cost

A.	Total Workers' Compensation Premium	$
B.	Total General Liability Premium	$
C.	Total Umbrella/Excess Liability Premium	$
D.	Anticipated Deductible Payments for Project Claims	$
E.	Subcontractors Premium	$
	Total Premiums	$
	Overhead (Est. @ ___%)	$
	Profit (Est. @ ___%)	$
	Contract Insurance Cost	$

Notes:

1. Include the total cost related to this insurance.
2. Questions regarding insurance calculations: Willis Towers Watson; Gary Meinen (412-863-4749)

Itemization of Insurance Costs for Additional Subcontractors:

D. Subcontractors Insurance Costs (Itemize Cost for Each Subcontractor)

Subcontractor	Estimated Contract Amount	Insurance Related Cost
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
➢		$
Total Subcontractors Insurance Costs:		$

SECTION 00 22 20 – BACKGROUND CHECKS & VERIFICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements governing clearance requirements of all Contracts, inclusive of Prime Contractors and their subcontractors.

1.03 REQUIRED CLEARANCES AND VERIFICATIONS

A. Competent Workmen, Prohibition of Illegal Alien Labor / Public Works Employment Verification Act

1. No person shall be employed to perform any work under the Contract if they are not legally eligible to be employed under applicable state and federal law or if they are not a trained, competent workman or mechanic, as applicable. For purposes of this Section, no workman or mechanic, as applicable, shall be regarded as competent unless he shall be duly skilled in the applicable branch of labor, and paid the applicable prevailing wage pursuant to Article 3.4.10 of the General Conditions.
2. Pursuant to the Act of May 11, 2006, (P.L. 173, No. 43), known as the Prohibition of Illegal Alien Labor on Assisted Projects Act, Contractor shall not knowingly employ, or knowingly permit any of its subcontractors to knowingly employ, the labor services of an illegal alien.
3. The Commonwealth of Pennsylvania enacted Act 141 of 2022, 71 P.S. Secs. 656.1-656.11, known as the Public Works Employment Verification Act (‘the Act’ or ‘Act 141’) which requires all public work contractors and subcontractors to utilize the Federal Government’s E-Verify system to ensure that all employees performing work on public work projects are authorized to work in the United States. The Contractor and its Subcontractor (as such term is defined in the Act) are required to comply with the Act and the Statement of Policy as published in the Pennsylvania Bulletin, July 22, 2023, and effective January 3, 2023. A separate and complete Verification Form required by the Public Works Employment Verification Act, Act No. 141 or 2022, 71 P.S. Secs. 656.1-656.11, (formerly Senate Bill 637 and Act 127) for itself and each of the proposed Subcontractors (as such term is defined therein) acknowledging its responsibilities and its compliance with the Public Works Employment Verification Act as a precondition of the Owner's Award of the Contract. The Act

requires all public work contractors and subcontractors to utilize the Federal Government's E-Verify system to ensure that all employees performing work on public work projects are authorized to work in the United States. The Contractor and its subcontractor (as such term is defined in the Act) are required to comply with the Act and the Statement of Policy as published in the Pennsylvania Bulletin, July 22, 2023, and effective January 3, 2023. The Verification Form shall include a certification that the information is true and correct, subject to sanctions provided by law. The respective Verification Form shall be executed by a representative who has sufficient knowledge and authority to make the representations and certifications contained in the Verification Form. Form included as Section 00 22 21.

4. A "Public Work" is defined to be construction, reconstruction, demolition, alteration and/or repair work other than maintenance work, done under contract and paid for in whole or in part out of the funds of a public body where the estimated cost of the total project is in excess of twenty-five thousand dollars ($25,000) but shall not include work performed under a rehabilitation or manpower training program.
5. The Department of General Services' Public Works Employment Verification Compliance Program is responsible for the administration, education and enforcement of the Act. It provides contractors and subcontractors with educational outreach, conducts investigations when complaints are received and random audits to ensure compliance with the requirements of the Act. Please direct your questions to the Public Works Employment Verification Compliance.

1.04 BACKGROUND CHECKS

A. Pennsylvania School Law, as required by Act 151 and Act 114 of 2006, as amended, requires that all applicants for employment in public and private schools, and employees of independent contractors seeking business with public and private schools undergo background checks if they will have direct contract with students. Prior to commencing Work, the Contractor and each Subcontractor shall submit on the prescribed form listed below for each employee or person performing work at the Project site on behalf of the Contractor and Subcontractor prior to such person performing any work at the Project site. The original clearances must be presented to the Owner prior to each employee, agent or subcontractor coming on the Owner's property. The Owner shall retain a copy of all such clearances in its file. Notwithstanding any other provision of the Contract, violation of this provision shall constitute grounds for immediate termination of the contract by the Owner.

B. Owner shall review the clearance submissions prior to each individual being permitted to come onto the Owner's property. The Owner reserves the right to reject any employee, agent or subcontractor that the Owner determines in its sole discretion has an unsatisfactory criminal history or child abuse clearance. The Owner shall retain a copy of all such clearances in its file. Notwithstanding any other provision of the Contract, violation of this provision shall constitute grounds for immediate termination of the contract by the Owner. Any individual rejected by the Owner shall not be permitted on the Owner's property. Owner's right to declare such person unfit shall not be limited to the required exclusion of persons from direct contact with children as set forth in Section 1-111 of the Pennsylvania Public School code and/or Subchapter C2 of the Child Protective Services Law.

C. Each employee or person performing work at the Project site on behalf of the Contractor or Subcontract must complete each of the following clearances:

1. **Department of Human Services (DHA) Child Abuse History**
Act 151 of December 16, 1994: Official clearance statement obtained from the Pennsylvania Department of Public Welfare pursuant to Act 151 of December 16, 1994 (P.L. 1292), subchapter C.2 of the Child Protective Services Law, as amended from time to time. Form included as Section 00 22 22. **Child Abuse reports shall be no more than one (1) year old at the time of employment**. Form is included as Section 00 22 22.

Procedure for Obtaining Child Abuse History Clearance:

a. You may obtain forms from schools or the Department of Human Services website. http://keepkidssafe.pa.gov/resources/clearances/index.htm.
b. The Pennsylvania Child Abuse History Clearance can be submitted and paid online through the Child Welfare Information Solutions (CWIS) self-service portal, https://www.compass.state.pa.us/cwis/public/home, or mailed in.
c. If you chose to mail the form, please enclose money order or check for each application in the amount indicated. No cash accepted. Personal, agency or business checks are acceptable.
d. Clearances results will be mailed within 14 days from the date that the clearance is received. There will be no replacement after 90 days.
e. Indicate SCHOOL as the "Purpose of Clearance."
f. For status of a request, please call the Department of Human Services, Childline and Abuse Registry at (717) 783-6211.

2. **Pennsylvania Access to Criminal History (PATCH)**
Act 34 of 1985: Original report of criminal history record information from the Pennsylvania State Police or a statement from the Pennsylvania State Police that the Pennsylvania State Police central repository contains no such information relating to any of Contractor's employees or its subcontractor's employees working on the Project site prior to such persons performing work at the Project site. **Clearances shall be dated no earlier than one year prior to the date presented to the Owner, but** such report of criminal history shall be no older than sixty (60) months old at any time the individual performs services under this Agreement. To obtain this document, contact the nearest Pennsylvania State Police barracks. Form included as Section 00 22 23.

Procedures for obtaining the PA State Police Background Clearance and associated costs can be found via the following link:
https://www.psp.pa.gov/Pages/Request-a-Criminal-History-Record.aspx#.U_Y5c010zIV.

3. **Federal Criminal History Record Information (CHRI) – FBI Report**
Act 114 of 2006, 24 PS 1-111 as amended (Act 61 of 2008): Copy of the Federal Criminal History record from the Federal Bureau of Investigation in the manner prescribed by the Department of Education. **Clearances shall be dated no earlier than one year prior to the date presented to the Owner**. The fingerprint-based background check is a multiple-step process, as follows:

a. **Registration** - The applicant must register prior to going to the fingerprint

site. Walk in service is allowed but all applicants are required to complete pre-enrollment in the new Universal Enrollment system. Pre- enrollment can be completed online or over the phone. The registration website is available online 24 hours/day, seven days per week at https://uenroll.identogo.com/ Telephonic registration is available at 1- 844-321-2101 Monday through Friday, 8am to 6pm EST. During the pre-enrollment process, all demographic data for the applicant is collected (name, address, etc.) along with notices about identification requirements and other important information.

b. When registering on-line, an applicant must use the PA Department of Education specific Service Code #1KG6XN. Fingerprint requests processed through any other agency or purpose cannot be accepted and are not transferrable. If an applicant enters the wrong code by mistake, the incorrect applicant type will appear at the top of the screen. The applicant should select the "Back to Home" button and begin the process again, by reentering the correct Service Code. If the applicant proceeds with the process under the incorrect code, the pre-enrollment and/or results cannot be transferred to another state agency and the applicant will have to start the process over and pay for the background check again.

c. Payment - The applicant will pay for the fingerprint service and to secure an unofficial copy of the Criminal History Record. Major Credit Cards as well as Money orders or cashier's checks payable to MorphoTrust will be accepted on site for those applicants who are required to pay individually. Applicants shall verify the cost of the clearance if using money order or cashier's check. No cash transactions or personal checks are allowed.

d. IDEMIA has also established a payment option for fingerprinting services for entities interested in paying the applicant's fee. This new option provides a payment 'coupon' that the entity will provide to each applicant for use. Each coupon is unique and may only be used one time. Account applications must be completed prior to the applicant visiting the fingerprint site. The authorized representative must complete the account application. To establish a billing account, you will need to complete an application at https://www.identogo.com/uploads/general/PA_NCAC_Package_Fillable_Fields.pdf with IDEMIA.

e. Fingerprint Locations – After registration, the applicant proceeds to the fingerprint site of their choice for fingerprinting. The location of the fingerprint sites and days and hours of operation for each site are posted on IDEMIA's website at https://uenroll.identogo.com/. The location of fingerprint sites may change over time; applicants are encouraged to confirm the site location nearest to their location. PDE encourages entities where access to the fingerprint location is more than 25 miles away to contact IDEMIA and suggest areas where another closer site could be established.

f. Fingerprinting - At the fingerprint site the Enrollment Agents (EA) manages the fingerprint collection process. The fingerprint transaction begins when the EA reviews the applicant's qualified State or Federal photo ID before processing the applicant's transaction. Applicants will not be processed if they cannot produce an acceptable photo ID. After the identity of the applicant has been established, all ten fingers are scanned to complete the

process. The entire fingerprint capture process should take no more than three to five minutes.

g. Report Access – For the public or private school or higher education institution to access the official report via the electronic system, applicants must present their UEID to the hiring entity (as shown on the receipt provided after fingerprint capture). This process allows an applicant to provide multiple potential employers with their UEID, as the report is linked to the UEID number and not assigned to a specific school. If an applicant has lost their receipt or needs to confirm UEID, the applicant may visit the UEP website (https://uenroll.identogo.com/) and simply check status of their file by providing alternate personal information. Applicants will enter their personal information after clicking in the lower portion of that screen to obtain their receipt with the UEID.

h. Applicants will receive an unofficial copy of their report.

4. **Act 24: Reporting Arrests and Convictions**

Act 24 of 2011 contains a number of significant changes to the Pennsylvania Public School Code that are designed to enhance the safety of school children. Among the changes, Act 24 amends Section 111 of the School Code to expand the list of prohibitive criminal offenses and ensure that then-current employees or those who will have contact with school children who may have been subject to a previous background check were required to provide assurances that they had not been previously arrested or convicted of a Section 111(e) offense.

Act 24 of 2011 and Act 82 of 2012: Original background check in accordance with Section 111 of the Public School Code of 1949, Act 34 of March 10, 1949, P.L. 30, No. 14, as amended by from time to time including, without limitation, by Act 114 of July 11, 2006, P.L. 1092, and Act 24 of 2011 (P.L. 112, No. 24) (24 P.S. Section 1-111, et seq.) on the form PDE 6004, Arrest/Conviction Report and Certification Form, published by the Pennsylvania Department of Education. The Contractor shall require employees performing at the Project Site on behalf of the Contractor and/or its Subcontractors to file form PDE-6004 within seventy-two (72) hours of an arrest or conviction of an offense listed in Section 1-111(e)of the Pennsylvania School Code. Contractor shall immediately notify the Owner in writing of such filing and shall preclude the affected employee from performing any work at the Project Site. The Owner shall also have the right to prohibit any such individual from coming onto its property. Form included as Section 00 22 24.

5. **Act 168: Commonwealth of Pennsylvania Sexual Misconduct/Abuse Disclosure Release**

Act 168 of 2014: “Commonwealth of Pennsylvania Sexual Misconduct/Abuse Disclosure Release” has been developed by the Pennsylvania Department of Education, pursuant to Act 168 of 2014, to be used by school entities and independent contractors of school entities and by applicants who would be employed by or in a school entity in a position involving direct contact with children to satisfy the Act’s requirement of providing information related to abuse or sexual misconduct. As required by Act 168, in addition to fulfilling the requirements under Section 1-111 of the School Code and the Child Protective Services Law (“CPSL”), an applicant who would be employed by or in a school

entity in a position having direct contact with children, must provide the information requested in SECTION 1 of this form and complete a written authorization that consents to and authorizes the disclosure by the applicant's current and former employers of the information requested in SECTION 2 of this form. The applicant shall complete one form for the applicant's current employer(s) and one for each of the applicant's former employers that were school entities or where the applicant was employed in a position having direct contact with children (therefore, the applicant may have to complete more than one form). Upon completion by the applicant, the hiring school entity or independent contractor shall submit the form to the applicant's current and former employers to complete SECTION 2. A school entity or independent contractor may not hire an applicant who does not provide the required information for a position involving direct contact with children. No employee or person who has been convicted of any of the offenses enumerated under 24 P.S. Section 1-111(e) shall be permitted to perform any work at the Project Site. Form included as Section 00 22 25.

6. PDFs of required clearance and verification forms can be found in the Project Manual as the followings Sections:

   a. 00 22 21Act 141: Public Works Employment Verification Form
   b. 00 22 22Act 151: Child Abuse Clearance Form
   c. 00 22 23Act 34: Pennsylvania State Police Clearance Form
   d. 00 22 24Act 24/Act 82: PDE Form 6004
   e. 00 22 25Act 168: PA Sexual Misconduct-Abuse Disclosure Release

   For additional information regarding the PDE Clearances and Background Checks please visit:
   https://www.education.pa.gov/Educators/Clearances/Pages/default.aspx

END OF SECTION 00 22 20



Commonwealth of Pennsylvania

Public Works Employment Verification Form

Complete and return the form to the contracting Public Body prior to the award of the contract.

Company Legal Name: _____

Doing Business As: _____
(if different from Legal Name)

Mailing Address: _____
Street Address 1

_____
Street Address 2

_____
City State Zip Code

Check one: ☐ Contractor ☐ Subcontractor

Contracting Public Body: _____

Contract/Project Number: _____

Project Description: _____

Project Location: _____

Date Enrolled in E-Verify (MM/DD/YYYY): _____

As a contractor/subcontractor for the above referenced public works contract, I hereby affirm that as of today's date, _____**,** our company is in compliance with the Public Works Employment Verification Act ('the Act') through utilization of the federal E-Verify Program (EVP) operated by the United States Department of Homeland Security. To the best of my/our knowledge, all employees hired are authorized to work in the United States.

It is also agreed to that all public works contractors/subcontractors will utilize the federal EVP to verify the employment eligibility of each new hire within five (5) business days of the employee start date throughout the duration of the public works contract. Documentation confirming the use of the federal EVP upon each new hire shall be maintained in the event of an investigation or audit.

I,_____, authorized representative of the company above, attest that the information contained in this verification form is true and correct and understand that the submission of false or misleading information in connection with the above verification shall be subject to sanctions provided by law.

_____ _____
Authorized Representative Signature **Date of Signature**

Printed Name: _____

Phone Number: _____ **Email:** _____

PENNSYLVANIA CHILD ABUSE HISTORY CERTIFICATION

Type or print clearly in ink. If obtaining this certification for non-volunteer purposes or if, as a volunteer having direct volunteer contact with children, you have obtained a certification free of charge within the previous 57 months, enclose an $13.00 money order or check payable to the PENNSYLVANIA DEPARTMENT OF HUMAN SERVICES or a payment authorization code provided by your organization. **DO NOT send cash.**

Certifications for the purpose of "volunteer having direct volunteer contact with children" may be obtained free of charge once every 57 months.

Send to CHILDLINE AND ABUSE REGISTRY, PA DEPARTMENT OF HUMAN SERVICES, P.O. BOX 8170 HARRISBURG, PA 17105-8170.

APPLICATIONS THAT ARE INCOMPLETE, ILLEGIBLE OR RECEIVED WITHOUT THE CORRECT FEE WILL BE RETURNED UNPROCESSED. IF YOU HAVE QUESTIONS CALL 717-783-6211, OR (TOLL FREE) 1-877-371-5422.

PURPOSE OF CERTIFICATION (Check one box only)

- ☐ Foster parent
- ☐ Prospective adoptive parent
- ☐ Employee of child care services
- ☐ School employee governed by the Public School Code
- ☐ School employee not governed by the Public School Code
- ☐ Self-employed provider of child-care services in a family child-care home
- ☐ An individual 14 years of age or older applying for or holding a paid position as an employee with a program, activity, or service
- ☐ An individual seeking to provide child-care services under contract with a child care facility or program
- ☐ An individual 18 years or older who resides in the home of a foster parent for children for at least 30 days in a calendar year
- ☐ An individual 18 years or older who resides in the home of a certified or licensed child-care provider for at least 30 days in a calendar year
- ☐ Volunteer having direct volunteer contact with children

  If purpose is volunteer having direct volunteer contact with children, choose SUB PURPOSE:
  - ☐ Big Brother/Big Sister and/or affiliate
  - ☐ Domestic violence shelter and/or affiliate
  - ☐ Rape crisis center and/or affiliate
  - ☐ Other: _____
- ☐ PA Department of Human Services Employment & Training Program participant (signature required below)

_____ SIGNATURE OF OIM/CAO REPRESENTATIVE

_____ OIM/CAO PHONE NUMBER

- ☐ An individual 18 years or older, excluding individuals receiving services, who resides in a family living home, community home for individuals with an intellectual disability, or host home for children for at least 30 days in a calendar year
- ☐ An individual 18 years or older who resides in the home of a prospective adoptive parent for at least 30 days in a calendar year

AGENCY/ORGANIZATION NAME:	PAYMENT AUTHORIZATION CODE, IF APPLICABLE:

☐ Consent/Release of Information Authorization form is attached. Applicant must fill in the "Other Address" sections. By completing the other address sections, you are agreeing that the organization will have access to the status and outcome of your certification application.

APPLICANT DEMOGRAPHIC INFORMATION (DO NOT USE INITIALS)

FIRST NAME	MIDDLE NAME	LAST NAME	SUFFIX
SOCIAL SECURITY NUMBER ___ ___	**GENDER** ☐ Male ☐ Female ☐ Not reported	**DATE OF BIRTH (MM/DD/YYYY)**	**AGE**

Disclosure of your Social Security number is voluntary. It is sought under 23 Pa.C.S. §§ 6336(a)(1) (relating to information in statewide database), 6344 (relating to employees having contact with children; adoptive and foster parents), 6344.1 (relating to information relating to certified or licensed child-care home residents), and 6344.2 (relating to volunteers having contact with children). The department will use your Social Security number to search the statewide database to determine whether you are listed as the perpetrator in an indicated or founded report of child abuse.

HOME ADDRESS	MAILING ADDRESS (if different from home address)	OTHER ADDRESS (if Consent/Release of Information Authorization form is attached)
ADDRESS LINE 1	ADDRESS LINE 1	ADDRESS LINE 1
ADDRESS LINE 2	ADDRESS LINE 2	ADDRESS LINE 2
CITY	CITY	CITY
COUNTY	COUNTY	COUNTY
STATE/REGION/PROVINCE	STATE/REGION/PROVINCE	STATE/REGION/PROVINCE
ZIP/POSTAL CODE	ZIP/POSTAL CODE	ZIP/POSTAL CODE
COUNTRY	COUNTRY	COUNTRY
☐ Different mailing address	ATTENTION	ATTENTION

CONTACT INFORMATION

HOME TELEPHONE NUMBER	WORK TELEPHONE NUMBER	MOBILE TELEPHONE NUMBER

EMAIL (By submitting an email contact, you are agreeing to ChildLine contacting you at this address.)

PENNSYLVANIA CHILD ABUSE HISTORY CERTIFICATION

PREVIOUS NAMES USED SINCE 1975 (Include maiden name, nickname and aliases.)			
First	**Middle**	**Last**	**Suffix**
1.			
2.			
3.			
4.			
5.			

PREVIOUS ADDRESSES SINCE 1975 (Please list all addresses since 1975, partial address acceptable; attach additional pages if necessary.)
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

HOUSEHOLD MEMBERS (Please list everyone who lived with you at any time since 1975 to present. Please include parent, guardian or the person(s) who raised you; attach additional pages as necessary.)			
Name (First, Middle, Last)	**Relationship**	**Present Age**	**Gender**
1.	☐ Parent ☐ Guardian ☐ person(s) who raised you		
2.	☐ Parent ☐ Guardian ☐ person(s) who raised you		
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

I affirm that the above information is accurate and complete to the best of my knowledge and belief and submitted as true and correct under penalty of law (Section 4904 of the Pennsylvania Crimes Code). If I selected volunteer, I understand that I can only use the certificate for volunteer purposes.

APPLICANT'S SIGNATURE

DATE

CHILDLINE USE ONLY		
DATE RECEIVED BY CHILDLINE	SUFFICIENT PAYMENT INFORMATION RECEIVED ☐ YES ☐ NO ☐ VALID PAYMENT AUTHORIZATION CODE ☐ WAIVED (supervisor initials) _____	CERTIFICATION ID #

INSTRUCTIONS TO COMPLETE THE PENNSYLVANIA CHILD ABUSE HISTORY CERTIFICATION APPLICATION:

General:

- Type or print clearly and neatly in ink only.
- If obtaining this certification for non-volunteer purposes or if, as a volunteer having direct volunteer contact with children, you have obtained a certification free of charge within the previous 57 months, enclose an $13.00 money order or check for each application. No cash will be accepted. Personal, agency, or business checks are acceptable. Certifications for the purpose of "volunteer having direct volunteer contact with children" may be obtained free of charge once every 57 months. If no payment is enclosed for a non-volunteer purpose, you must provide a payment authorization code, otherwise your application will be rejected and returned to you.
- **DO NOT SEND POSTAGE PAID RETURN ENVELOPES** for us to return your results. Results are issued through an automated system generated mailing process.
- Certification results will be mailed to you within 14 days from the date the certification application is received at the ChildLine and Abuse Registry.
- Failure to comply with the instructions will cause considerable delay in processing the results of an applicant's child abuse history certification application.

Purpose of Certification - Do not check more than one box**:**

- Check the **foster parent** box if applying for purposes of providing foster care.
- Check the **prospective adoptive parent** box if applying for the purpose of adoption.
- Check the **employee of child care services** box if applying for the purpose of child care services in the following:
  - Child day care centers; group day care homes; family day care homes; boarding homes for children; juvenile detention center services or programs for delinquent or dependent children; mental health services for children; services for children with intellectual disabilities; early intervention services for children; drug and alcohol services for children; and day care services or other programs that are offered by a school.
- Check the **school employee governed by the Public School Code** box if you are a school employee who is required to obtain background checks pursuant to Section 111 of the Public School Code and will continue to be required to obtain background checks prior to employment in accordance with that section and on the periodic basis required by Act 153.
- Check the **school employee not governed by the Public School Code** box if you are a school employee not governed by Section 111 of the Public School Code, but covered by Act 153 (pertaining to school employees in institutions of higher education).

  Definition of school employee: A school employee is defined as an individual who is employed by a school or who provides a program, activity or service sponsored by a school. The term does not apply to administrative or other support personnel unless they have direct contact with children.

  Definition of school: A facility providing elementary, secondary or postsecondary educational services. The term includes the following:

  (1) Any school of a school district.
  (2) An area vocational-technical school.
  (3) A joint school.
  (4) An intermediate unit.
  (5) A charter school or regional charter school.
  (6) A cyber charter school.
  (7) A private school licensed under the act of January 28, 1988 (P.L.24, No. 11), known as the Private Academic Schools Act.
  (8) A private school accredited by an accrediting association approved by the state Board of Education.
  (9) A non-public school.
  (10) An institution of higher education.
  (11) A private school licensed under the act of December 15, 1986 (P.L. 1585, No. 174), known as the Private Licensed Schools Act.
  (12) The Hiram G. Andrews Center.
  (13) A private residential rehabilitative institution as defined in section 914.1-A(c) of the Public School Code of 1949.
- Check the **self-employed provider of child-care services in a family child-care home** if providing child care services in one's home (other than the child's own home) at any one time to four, five, or six children who are not relatives of the caregiver.
- Check the **individual 14 years of age or older who is applying for or holding a paid position as an employee** box if the employment is with a **program, activity, or service, as a person responsible for the child's welfare or having direct contact with children:** Applying as an employee who is responsible for the child's welfare or having direct contact (providing care, supervision, guidance, or control to children or having routine interaction with children) in any of the following in which children participate and which is sponsored by a school or public or private organization:
  - A youth camp or program;
  - A recreational camp or program;
  - A sports or athletic program;
  - A community or social outreach program;
  - An enrichment or educational program; and
  - A troop, club, or similar organization
- Check the **individual seeking to provide child care services under contract with a child care facility or program** box if you are providing child care services as part of a contract or grant funded program.
- Check the box for **individual 18 years or older who resides in the home of a foster parent for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.
- Check the box for **individual 18 years or older who resides in the home of a certified or licensed child-care provider for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.

- Check the box for **individual 18 years or older, excluding individuals receiving services, who resides in a family living home, community home for individuals with an intellectual disability, or host home for children for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.
- Check the box for **individual 18 years or older who resides in the home of a prospective adoptive parent for at least 30 days in a calendar year** if you are an adult household member in this setting and require certification.
- Check the **volunteer having direct volunteer contact with children** box if applying for the purpose of volunteering as an adult for an unpaid position as a volunteer with a child-care service, a school, or a program, activity or service as a person responsible for the child's welfare or having direct volunteer contact with children. In addition, check the box of one of the organizations listed, i.e. Big Brother/Big Sister, domestic violence shelter, rape crisis center. If you are **NOT** applying for a volunteer in one of the organizations listed, please check the **other** box and write the name of the organization in the space provided.
- Check the **PA Department of Human Services employment & training program participant** box if you are applying for the purpose of participating in a PA Department of Human Services employment and training program through a county assistance office (CAO) or the Office of Income Maintenance (OIM). The signature **AND** phone number of the CAO or OIM representative is required. If there is no signature and no phone number, your application will be rejected and returned to you.
- If you were provided a "**PAYMENT AUTHORIZATION CODE**" by an organization, please provide the **agency/organization name** in the space provided and the **payment authorization code** in the space provided.
- Please check the **CONSENT/RELEASE OF INFORMATION** box if you included a payment code in the space above and attached the completed Consent/Release of Information Authorization form to your Pennsylvania Child Abuse History Certification application when you mail it to our office. The Consent/Release of Information Authorization form allows the department to send your results to a third party. If the Consent/Release of Information Authorization form is **NOT** attached to the certification application, the results **WILL** be mailed to the applicant's home address and not to the third party.

Applicant Demographic Information:

- Name - Include the applicant's full legal name. Initials are not acceptable for a first name. If your full legal name is an initial, please provide supporting documentation along with your certification application.
- Social Security number - Include the applicant's social security number. A social security number is voluntary; **HOWEVER, PLEASE NOTE THAT APPLICATIONS THAT DO NOT INCLUDE SOCIAL SECURITY NUMBERS MAY TAKE LONGER TO BE PROCESSED.**
- Gender - Please check one box.
- Date of birth - Fill in the applicant's date of birth (Example: 01/22/1990).
- Age - Fill in the applicant's current age.

Address:

- The address listed must be the applicant's current home address. This is also where the results of the certification will be mailed, unless otherwise noted. If the **different mailing address** box is checked and a mailing address is provided in the "different" mailing address column, the results will be mailed to the "mailing" address and not the "home" address. **Note:** If the consent/release of information box is checked and an "other" address is provided, the results will be mailed to the "other" address.

Contact Information:

- Please provide your home, work or mobile telephone number. Fill in the number where the applicant can be reached in the event that there are questions about the information on the application.
- Please provide an email address. By providing an email address, you are consenting to ChildLine contacting you by email in the event that you cannot be reached by phone. **NO CONFIDENTIAL INFORMATION WILL EVER BE SHARED OR PROVIDED IN AN EMAIL FROM OUR OFFICE.**

Previous Names Used Since 1975:

- The applicant must list any and all full legal names that they have ever had since 1975. This includes maiden names, nicknames, aliases and also known as (aka) names.

Previous Addresses Since 1975:

- List all addresses where the applicant has resided since 1975. The applicant can attach an additional sheet of paper with all of the addresses listed if necessary. If the applicant cannot remember the exact mailing addresses since 1975, filling in as much information as possible about the location is acceptable.

Household Members:

- Include anyone that the applicant lived with since 1975 (parents, guardians, siblings, children, spouse (ex), paramour, friends, etc.). In addition, include the household member's relationship to the applicant, their age (to the best of your knowledge) and their gender. If the applicant was under the age of 18 in 1975, this section **MUST** include the applicant's PARENT(S) or GUARDIAN(S). If this section is left blank, the application will be rejected and returned to the applicant.

Signature:

- Applications **MUST** be signed and dated. Applications that are not signed and dated will be rejected and returned to the applicant.

CHILDLINE USE ONLY:

- Please DO NOT WRITE in this section. This is for CHILDINE staff only.

Additional Information:

Applicants can visit https://www.compass.state.pa.us/CWIS for more information about submitting the child abuse certification online or to register for a business/organization account.

SP 4-164 (12-2020)

PENNSYLVANIA STATE POLICE

REQUEST FOR CRIMINAL RECORD CHECK

1-888-QUERYPA (1-888-783-7972)

This form is to be completed in ink by the requester – (information will be mailed to the requester only). If this form is not legible or not properly completed, it will be returned unprocessed to the requester.

TRY OUR WEBSITE FOR A QUICKER RESPONSE
https://epatch.state.pa.us

REQUESTER NAME	
ADDRESS	
CITY/STATE/ ZIP CODE	
TELEPHONE NO. (AREA CODE)	

FOR CENTRAL REPOSITORY USE ONLY
CONTROL NUMBER

AFTER COMPLETION MAIL TO:

PENNSYLVANIA STATE POLICE
CENTRAL REPOSITORY – 164
1800 ELMERTON AVENUE
HARRISBURG, PA 17110-9758

DO NOT SEND CASH OR PERSONAL CHECK

CHECK ONE BLOCK

◯ **INDIVIDUAL/NONCRIMINAL JUSTICE AGENCY – ENCLOSE A CERTIFIED CHECK/MONEY ORDER IN THE AMOUNT OF $22.00, PAYABLE TO: "*COMMONWEALTH OF PENNSYLVANIA*" THE FEE IS NONREFUNDABLE**

◯ **NOTARIZED INDIVIDUAL/NONCRIMINAL JUSTICE AGENCY – ENCLOSE A CERTIFIED CHECK/MONEY ORDER IN THE AMOUNT OF $27.00, PAYABLE TO: "*COMMONWEALTH OF PENNSYLVANIA*" THE FEE IS NONREFUNDABLE**

◯ **FEE EXEMPT-NONCRIMINAL JUSTICE AGENCY – NO FEE**

SUBJECT OF RECORD CHECK

(FIRST)	(MIDDLE)	(LAST)		
MAIDEN NAME AND/OR ALIASES	**SOCIAL SECURITY NUMBER**	**DATE OF BIRTH (MM/DD/YYYY)**	**SEX** Select	**RACE** Select

The Pennsylvania State Police response will be based on the comparison of the data provided by the requester against the information *contained in the files of the Pennsylvania State Police Central Repository only.*

FEES FOR REQUESTS - $22.00. NOTARIZED FEE REQUESTS - $27.00.
******MAKE ALL MONEY ORDERS PAYABLE TO: COMMONWEALTH OF PENNSYLVANIA ******

REASON FOR REQUEST

◄◄◄◄◄◄CHECK THE BOX THAT MOST APPLIES TO THE PURPOSE OF THIS REQUEST►►►►►►

◯ **INTERNATIONAL ADOPTION - INTERNATIONAL ADOPTION MUST BE NOTARIZED AND MAILED IN. ($27.00 FOR REQUEST)**

◯ **ADOPTION (DOMESTIC)** ◯ **EMPLOYMENT** ◯ **VISA** ◯ **OTHER**

WARNING: 18 Pa.C.S. 4904(b) UNDER PENALTY OF LAW - MISIDENTIFICATION OR FALSE STATEMENTS OF IDENTITY TO OBTAIN CRIMINAL HISTORY INFORMATION OF ANOTHER IS PUNISHABLE AS AUTHORIZED BY LAW.

Homeland Security is Everyone's Responsibility - Pennsylvania Terrorism Tip Line 1-888-292-1919

ARREST/CONVICTION REPORT AND CERTIFICATION FORM
(under Act 24 of 2011 and Act 82 of 2012)

Section 1. Personal Information

Full Legal Name: _____

Date of Birth: _____/_____/_____

Other names by which you have been identified: _____

Section 2. Arrest or Conviction

☐ By checking this box, I state that I have NOT been arrested for or convicted of any Reportable Offense.

☐ By checking this box, I report that I have been arrested for or convicted of an offense or offenses enumerated under 24 P.S. §§1-111(e) or (f.1) ("Reportable Offense(s)"). See Page 3 of this Form for a list of Reportable Offenses.

Details of Arrests or Convictions

For each arrest for or conviction of any Reportable Offense, specify in the space below (or on additional attachments if necessary) the offense for which you have been arrested or convicted, the date and location of arrest and/or conviction, docket number, and the applicable court.

_____

_____

Section 3. Child Abuse

☐ By checking this box, I state that I have NOT been named as a perpetrator of a founded report of child abuse within the past five (5) years as defined by the Child Protective Services Law.

☐ By checking this box, I report that I have been named as a perpetrator of a founded report of child abuse within the past five (5) years as defined by the Child Protective Services Law.

Section 4. Certification

By signing this form, I certify under penalty of law that the statements made in this form are true, correct and complete. I understand that false statements herein, including, without limitation, any failure to accurately report any arrest or conviction for a Reportable Offense, shall subject me to criminal prosecution under 18 Pa.C.S. §4904, relating to unsworn falsification to authorities.

_____

Signature *Date*

INSTRUCTIONS

Pursuant to 24 P.S. §1-111(c.4) and (j), the Pennsylvania Department of Education developed this standardized form (PDE-6004) to be used by current and prospective employees of public and private schools, intermediate units, and area vocational-technical schools.

As required by subsection (c.4) and (j)(2) of 24 P.S. §1-111, this form shall be completed and submitted by all current and prospective employees of said institutions to provide written reporting of any arrest or conviction for an offense enumerated under 24 P.S. §§1-111(e) and (f.1) and to provide notification of having been named as a perpetrator of a founded report of child abuse within the past five (5) years as defined by the Child Protective Services Law.

As required by subsection (j)(4) of 24 P.S. §1-111, this form also shall be utilized by current and prospective employees to provide written notice within seventy-two (72) hours after a subsequent arrest or conviction for an offense enumerated under 24 P.S. §§1-111(e) or (f.1).

In accordance with 24 P.S. §1-111, employees completing this form are required to submit the form to the administrator or other person responsible for employment decisions in a school entity. Please contact a supervisor or the school entity administration office with any questions regarding the PDE 6004, including to whom the form should be sent.

PROVIDE ALL INFORMATION REQUIRED BY THIS FORM LEGIBLY IN INK.

LIST OF REPORTABLE OFFENSES

- **A reportable offense enumerated under 24 P.S. §1-111(e) consists of any of the following:**

(1) An offense under one or more of the following provisions of Title 18 of the Pennsylvania Consolidated Statutes:

- Chapter 25 (relating to criminal homicide)
- Section 2702 (relating to aggravated assault)
- Section 2709.1 (relating to stalking)
- Section 2901 (relating to kidnapping)
- Section 2902 (relating to unlawful restraint)
- Section 2910 (relating to luring a child into a motor vehicle or structure)
- Section 3121 (relating to rape)
- Section 3122.1 (relating to statutory sexual assault)
- Section 3123 (relating to involuntary deviate sexual intercourse)
- Section 3124.1 (relating to sexual assault)
- Section 3124.2 (relating to institutional sexual assault)
- Section 3125(relating to aggravated indecent assault)
- Section 3126 (relating to indecent assault)
- Section 3127 (relating to indecent exposure)
- Section 3129 (relating to sexual intercourse with animal)
- Section 4302 (relating to incest)
- Section 4303 (relating to concealing death of child)
- Section 4304 (relating to endangering welfare of children)
- Section 4305 (relating to dealing in infant children)
- A felony offense under section 5902(b) (relating to prostitution and related offenses)
- Section 5903(c) or (d) (relating to obscene and other sexual materials and performances)
- Section 6301(a)(1) (relating to corruption of minors)
- Section 6312 (relating to sexual abuse of children)
- Section 6318 (relating to unlawful contact with minor)
- Section 6319 (relating to solicitation of minors to traffic drugs)
- Section 6320 (relating to sexual exploitation of children)

(2) An offense designated as a felony under the act of April 14, 1972 (P.L. 233, No. 64), known as "The Controlled Substance, Drug, Device and Cosmetic Act."

(3) An offense SIMILAR IN NATURE to those crimes listed above in clauses (1) and (2) under the laws or former laws of:

- the United States; or
- one of its territories or possessions; or
- another state; or
- the District of Columbia; or
- the Commonwealth of Puerto Rico; or
- a foreign nation; or
- under a former law of this Commonwealth.

- **A reportable offense enumerated under 24 P.S. §1-111(f.1) consists of any of the following:**

(1) An offense graded as a felony offense of the first, second or third degree, other than one of the offenses enumerated under 24 P.S. §1-111(e), if less than (10) ten years has elapsed from the date of expiration of the sentence for the offense.

(2) An offense graded as a misdemeanor of the first degree, other than one of the offenses enumerated under 24 P.S. §1-111(e), if less than (5) five years has elapsed from the date of expiration of the sentence for the offense.

(3) An offense under *75 Pa.C.S. § 3802(a)*, (b), (c) or (d)(relating to driving under influence of alcohol or controlled substance) graded as a misdemeanor of the first degree under *75 Pa.C.S. § 3803* (relating to grading), if the person has been previously convicted of such an offense and less than (3) three years has elapsed from the date of expiration of the sentence for the most recent offense.

COMMONWEALTH OF PENNSYLVANIA
SEXUAL MISCONDUCT/ABUSE DISCLOSURE RELEASE
(Pursuant to Act 168 of 2014)

Instructions

This standardized form has been developed by the Pennsylvania Department of Education, pursuant to Act 168 of 2014, to be used by school entities and independent contractors of school entities and by applicants who would be employed by or in a school entity in a position involving direct contact with children to satisfy the Act's requirement of providing information related to abuse or sexual misconduct. As required by Act 168, in addition to fulfilling the requirements under section 111 of the School Code and the Child Protective Services Law ("CPSL"), an applicant who would be employed by or in a school entity in a position having direct contact with children, must provide the information requested in SECTION 1 of this form and complete a written authorization that consents to and authorizes the disclosure by the applicant's current and former employers of the information requested in SECTION 2 of this form. The applicant shall complete one form for the applicant's current employer(s) and one for each of the applicant's former employers that were school entities or where the applicant was employed in a position having direct contact with children (therefore, the applicant may have to complete more than one form). Upon completion by the applicant, the hiring school entity or independent contractor shall submit the form to the applicant's current and former employers to complete SECTION 2. **A school entity or independent contractor may not hire an applicant who does not provide the required information for a position involving direct contact with children.**

Relevant Definitions:

Direct Contact with Children is defined as: "the possibility of care, supervision, guidance or control of children or routine interaction with children."

Sexual Misconduct is defined as: "any act, including, but not limited to, any verbal, nonverbal, written or electronic communication or physical activity, directed toward or with a child or a student regardless of the age of the child or student that is designated to establish a romantic or sexual relationship with the child or student. Such acts include, but are not limited to: (1) sexual or romantic invitation; (2) dating or soliciting dates; (3) engaging in sexualized or romantic dialogue; (4) making sexually suggestive comments; (5) self-disclosure or physical exposure of a sexual, romantic or erotic nature; or (6) any sexual, indecent, romantic or erotic contact with the child or student."

Abuse is defined as "conduct that falls under the purview and reporting requirements of the CPSL, 23 Pa.C.S. Ch. 63, is directed toward or against a child or a student, regardless of the age of the child or student."

Please Note

A prospective employer that receives any requested information regarding an applicant may use the information for the purpose of evaluating the applicant's fitness to be hired or for continued employment and shall report the information as appropriate to the Department of Education, a state licensing agency, law enforcement agency, child protective services agency, another school entity or to a prospective employer.

If the prospective employer decides to further consider an applicant after receiving an affirmative response to any of the questions listed in SECTIONS 1 and 2 of this form, the prospective employer shall request that former employers responding affirmatively to the questions provide additional information about the matters disclosed and include any related records. The **Commonwealth of Pennsylvania Sexual Misconduct/Abuse Disclosure Information Request** can be used to request this follow-up information. Former employers shall provide the additional information and records within 60 calendar days of the prospective employer's request.

The completed form and any information or records received shall not be considered public records for the purposes of the Act of February 14, 2008 (P.L. 6, No. 3) known as the "Right to Know Law."

The Department of Education shall have jurisdiction to determine willful violations of Act 168 and may, following a hearing, assess a civil penalty not to exceed $10,000. School entities shall be barred from entering into a contract with an independent contractor who is found to have willfully violated the provisions of Act 168.

COMMONWEALTH OF PENNSYLVANIA
SEXUAL MISCONDUCT/ABUSE DISCLOSURE RELEASE
(under Act 168 of 2014)

(Hiring school entity or independent contractor submits this form to ALL current employer(s) and to former employer(s) that were school entities and/or where the applicant had direct contact with children)

To:

Name of Current or Former Employer:		☐ No applicable employment
Street Address:		
City, State, Zip:		
Telephone Number:	Fax Number:	Email:
Contact Person:		Title:

The named applicant is under consideration for a position with our entity. The Pennsylvania General Assembly has determined that additional safeguards are necessary in the hiring of school employees to ensure the safety of the Commonwealth's students. The individual whose name appears below has reported previous employment with your entity. We request you provide the information requested in SECTION 2 of this form within **20 calendar days** as required by Act 168 of 2014.

SECTION 1: APPLICANT CERTIFICATION AND RELEASE (TO BE COMPLETED BY THE APPLICANT EVEN IF THE APPLICANT HAS NO CURRENT OR PRIOR EMPLOYMENT TO DISCLOSE)

Applicant's Name (First, Middle, Last):	
Any former names by which the Applicant has been identified:	
DOB:	
Last 4 digits of Applicant's Social Security Number:	PPID (if applicable):
Approximate dates of employment with the entity listed above:	
Position(s) held with the entity:	

Pursuant to Act 168, an employer, school entity, administrator, and/or independent contractor that provides information or records about a current or former employee or applicant shall be immune from criminal liability under the CPSL, the Educator Discipline Act, and from civil liability for the disclosure of the information, unless the information or records provided were knowingly false. Such immunity shall be in addition to and not in limitation of any other immunity provided by law or any absolute or conditional privileges applicable to such disclosure by the virtue of the circumstances of the applicant's consent thereto. Under Act 168, the willful failure to respond to or provide the information and records as requested may result in civil penalties and/or professional discipline, where applicable.

Have you (Applicant) ever:

Yes ◯ No ◯ Been the subject of an abuse or sexual misconduct investigation by any employer, state licensing agency, law enforcement agency or child protective services agency (unless the investigation resulted in a finding that the allegations were false)?

Yes ◯ No ◯ Been disciplined, discharged, non-renewed, asked to resign from employment, resigned from or otherwise separated from employment while allegations of abuse or sexual misconduct were pending or under investigation or due to adjudication or findings of abuse or sexual misconduct?

Yes ◯ No ◯ Had a license, professional license or certificate suspended, surrendered or revoked while allegations of abuse or sexual misconduct were pending or under investigation or due to an adjudication or findings of abuse or sexual misconduct?

By signing this form, I certify under penalty of law that the statements made in this form are correct, complete, and true to the best of my knowledge. I understand that false statements herein, including, without limitation, any willful failure to disclose the information required, shall subject me to criminal prosecution under 18 Pa.C.S. § 4904 (relating to unsworn falsification to authorities) and to discipline up to, and including, termination or denial of employment, and may subject me to civil penalties and disciplinary action under the Educator Discipline Act. I also hereby authorize the above-named employer to release to the entity listed on page 3, the information requested in SECTION 2 of this form and any related records. I hereby release, waive, and discharge the above-named employer from any and all liability of any kind that may arise from such disclosure or release of records. I understand that third party vendors may be used to process this Act 168 pre-employment history review.

_____ _____

Signature of Applicant Date

SECTION 2: CURRENT/FORMER EMPLOYER VERIFICATION (TO BE COMPLETED BY THE APPLICANT'S CURRENT EMPLOYER(S) AND ALL FORMER EMPLOYERS THAT WERE SCHOOL ENTITIES AND/OR WHERE THE APPLICANT HAD DIRECT CONTACT WITH CHILDREN)

Dates of employment of Applicant: _____ Contact telephone #:_____

To the best of your knowledge, has Applicant ever:

Yes ◯ No ◯ Been the subject of an abuse or sexual misconduct investigation by any employer, state licensing agency, law enforcement agency or child protective services agency (unless the investigation resulted in a finding that the allegations were false)?

Yes ◯ No ◯ Been disciplined, discharged, non-renewed, asked to resign from employment, resigned from or otherwise separated from employment while allegations of abuse or sexual misconduct were pending or under investigation or due to adjudication or findings of abuse or sexual misconduct?

Yes ◯ No ◯ Had a license, professional license or certificate suspended, surrendered or revoked while allegations of abuse or sexual misconduct were pending or under investigation or due to an adjudication or findings of abuse or sexual misconduct?

☐ No records or other evidence currently exists regarding the above questions. I have no knowledge of information pertaining to the applicant that would disqualify the applicant from employment.

_____ _____

Former Employer Representative Signature and Title Date

Return all completed information to:

School Entity/Independent Contractor:	
Address:	Phone:
City: State: Zip:	Fax: Email:
Contact Person:	Title:

Date Form Received: _____ Received by: _____

SECTION 00 31 32 - GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 INFORMATION AVAILABLE TO BIDDERS – GEOTECHNICAL DATA

A. This Document and its referenced specifications and drawings are included in the Procurement and Contracting Requirements for Project as they provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information and are not a warranty of existing conditions. All Bidders will receive the following list of reference documents:

1. Geotechnical Engineering Reports, including all Appendices, for the Pottsgrove HS Facility & Athletics Improvement Project (the “Project”) prepared by David Blackmore Associates dated May 15, 2026, is included as Specification Section 00 31 33.
2. Infiltration Testing Plan and Logs, including all Appendices, for the Pottsgrove HS Facility & Athletics Improvement Project (the “Project”) prepared by K&W Engineers May 26, 2026, is included as Specification Section 00 31 34.

B. Geotechnical Data provided as part of this Section and its referenced documents shall not constitute a Contract Document and shall be considered as “general information” only. The data indicated for subsurface conditions is not a representation or guarantee of the continuity of such conditions including variations in kind, depth, quantity, and conditions of soil. The Owner, Construction Manager, and Architect will not be responsible for interpretations or conclusions drawn from the Geotechnical Report(s) by the Bidder. The Owner, Construction Manager, and Architect are not responsible for the accuracy or completeness of the information given in the Geotechnical Report(s).

C. Bidders may rely on the technical data contained in such reports and information presented herein, but not upon non-technical data, interpretations, recommendations, or opinions contained therein or for the completeness thereof for Bidder’s purposes. Bidders shall determine the adequacy of the included geotechnical data for use in preparing the Bid. Should the data contained in the above referenced document(s) not be adequate for the Bidder’s purposes, the Bidder may make, prior to bidding, his own exploration, tests, and analyses.

D. Bidders should visit the site to familiarize themselves with existing conditions. No claims will be honored for inadequacy of data contained within the provided geotechnical reports. Should Bidder determine that additional information is required, the Bidder shall make, prior to bidding, his own exploration, tests, and analyses.

E. Contact CMTA, Inc., Construction Manager (CM), Scott Kennedy at (267) 718-0148 to schedule additional exploration or tests. Bidders shall provide insurance certificates as per General Conditions Article 11 and other information required prior to performing additional exploration or tests.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 00 31 32

Providing Innovative Solutions to Subsurface Problems Since 1985

DAVID BLACKMORE & ASSOCIATES, INC.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

REPORT OF GEOTECHNICAL EXPLORATION

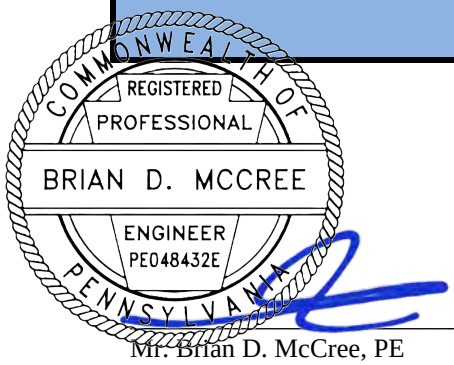
Pottsgrove High School Stadium Renovation Project
1301 Kauffman Road
Pottstown Borough, Montgomery County, PA

PREPARED FOR

Pottsgrove School District
c/o CMTA. Inc.
1400 N. Providence Road,
Building #2, Suite 4025
Media, PA 19063

PROJECT 5813G1R1
May 14, 2026

DAVID BLACKMORE AND ASSOCIATES, INC.
3335 WEST RIDGE PIKE
POTTSTOWN, PENNSYLVANIA 19464
(610) 495-6255



Mr. Brian D. McCree, PE
President

AYM

Mr. Angel Y. Matos, EIT
Geotechnical Engineer

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY 4
1. INTRODUCTION 5
2. PROPOSED CONSTRUCTION 6
3. GEOTECHNICAL EXPLORATION 6
4. GEOTECHNICAL BACKGROUND 6
4.1 SITE DESCRIPTION 6
4.2 GEOLOGY 7
4.3 SOILS 7
5. LABORATORY TESTING 8
6. SUBSURFACE CONDITIONS 9
7. GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS 10
7.1 SITE PREPARATION 11
7.1A SOIL REPLACEMENT 11
7.2 FOUNDATIONS 12
7.2.1 SITE SEISMIC CONDITIONS 13
7.3 ROCK REMOVAL 14
7.4 SLAB ON-GRADE 15
7.5 BACKFILL OF FOUNDATION AND UTILITY TRENCHES 16
7.6 PAVEMENTS AND WALKWAYS 16
7.7 FILL AND COMPACTION CRITERIA 17
7.8 LATERAL EARTH PRESSURES - RETAINING WALLS 18
8. QUALITY CONTROL 19
9. LIMITATIONS 20

FIGURES AND TABLES

FIGURE I: *SITE LOCATION*
FIGURE II: *GEOLOGY*
FIGURE III: *SOILS*

TABLE I: *LABORATORY TEST RESULTS*
TABLE IIA: *ROCK ELEVATIONS*
TABLE IIB: GROUNDWATER ELEVATIONS
TABLE III: *COMPACTION CRITERIA*

APPENDIX

SOIL PARTICLE SIZE ANALYSIS RESULTS
SOIL PLASTIC AND LIQUID LIMIT TEST RESULTS
TEST BORING LOGS
BORING LOCATION PLAN

EXECUTIVE SUMMARY

Purpose

This exploration was conducted to evaluate subsurface conditions and their effects on the proposed site development. This exploration focused on the proposed stadium improvements including new bleachers, storage buildings, restrooms, and concession areas within the existing stadium located at the Pottsgrove High School Campus at 1301 Kauffman Road, in Pottsgrove, PA

Scope

A total of ten (10) borings were drilled at the project site to a maximum depth of 21 feet or to auger refusal on bedrock. These borings were located within accessible portions of the planned building footprint areas as indicated on the attached preliminary site plan. The test borings were drilled by our subcontractor, The Corcoran Drilling Company, under the direction of DBA personnel.

Findings

The results of our exploration indicate the presence of the following subsurface conditions:

- Existing fill soils
- Shallow depth to bedrock
- Shallow depth to groundwater

The drilling program encountered a 6 inch to 4-foot-thick deposit of existing fill (Stratum IF) in three of the test borings completed (B2, B6, B9). This fill consists of orange-brown and reddish-brown fine sand and clayey silt with shale fragments, and organic silt. This stratum is variable in strength and content, with SPR values ranging from 4 blows per foot (B/F) to 10 B/F. The native soil profile includes a layer of reddish-brown fine sand and silt with shale fragments (Stratum II). This layer then transitions to red weathered shale (Stratum III) at depths ranging from 2.67 feet to 8 feet below the existing grade.

Shale bedrock was encountered in nine of the borings completed. Depths to bedrock range from 6.58 feet to 16.33 feet below the existing grade at elevations from 198.41 feet to 209.64 feet. Dense weathered shale, as shown by augering difficulty, was also encountered in nine of the test borings completed at depths ranging from 4 to 14.74 feet below the existing grade at elevations of 199.39 feet to 213.84 feet. See Table IIA- Approximate Rock Elevation for information at each boring location.

Groundwater was encountered in four of the test borings completed at depths ranging from 9.75 feet to 18.50 feet below the existing grade at elevations from 196.92 feet to 204.99 feet. See Table IIB – Approximate Groundwater Elevations for information at each boring location.

Recommendations:

The site conditions are suitable for the support of the proposed structure. A shallow foundation system with slab-on-grade construction is feasible, provided that the recommendations included herein are followed. DBA recommends a removal and replacement of Stratum IF as noted in section 7.1A – Soil Replacement.

1. INTRODUCTION

David Blackmore and Associates, Inc. (DBA) has completed the geotechnical exploration of the subject site in accordance with our Proposal 5813G1P1, dated February 18, 2026. This exploration was completed to evaluate the existing subsurface conditions and their effect upon the proposed site development. Specifically, DBA has provided recommendations regarding the following:

- Foundation support of the structure and slabs, including soil bearing pressures, bearing elevations, foundation design recommendations, and anticipated settlement for shallow foundations,
- Alternate foundation systems(if required),
- Depth to material requiring rock excavation methods for removal, if encountered,
- Depth to and management of groundwater for design of structures and pavements, if encountered
- Relative elevations of surface and subsurface features,
- Fill and compaction criteria,
- Pavements and floor slabs,
- Permeability of subgrade soils at proposed seepage basin areas,
- Lateral earth pressures for retaining walls, and
- General geotechnical related construction procedures.

The following section (2. PROPOSED CONSTRUCTION) summarizes the information available to DBA regarding the proposed site development. This report has been prepared based on the proposed construction. Changes to the proposed construction may require alterations to this report or additional investigative work. DBA should be notified of significant changes to the proposed construction.

2. PROPOSED CONSTRUCTION

The proposed construction includes new bleachers, support buildings, a synthetic turf field, and a running track. The new support buildings are to include a buildings and grounds maintenance and storage building; concession stand and associated patio area with restroom facilities on the home side of the stadium and a restroom and concession building on the visitor's side of the stadium. These buildings are anticipated to be single story structures using a shallow concrete foundation system with structural steel framing, slab-on-grade construction, and masonry interior and exterior walls. The information in this report is preliminary and subject to revision during plan development.

3. GEOTECHNICAL EXPLORATION

A total of ten (10) borings were drilled at the project site to a maximum depth of 21 feet or to auger refusal on bedrock. These borings were located within accessible portions of the planned building footprint areas as indicated on the attached preliminary site plan.

The test borings were drilled by our subcontractor, **The Corcoran Drilling Company**, under the direction of DBA personnel.

All test boring logs and a test boring location plan are included in the appendix of this report.

4. GEOTECHNICAL BACKGROUND

4.1 SITE DESCRIPTION

The subject site is the existing football stadium at the Pottsgrove High School Campus located at 1301 Kauffman Road. The site is currently used as the school's athletic fields, with existing fields, bleachers, a facilities building, and a garage. The site slopes downward in the westerly direction from an elevation of

approximately 220 feet along school lane to approximately 210 feet on the western side of the existing home bleachers.

A copy of the USGS Topographical Map, Sassamansville Quadrangle, indicating the site is included as Figure I.

4.2 GEOLOGY

Available geological sources indicate the site is underlain by the Brunswick Formation (TrB). This formation consists of reddish-brown shale, mudstone, and siltstone with argillite and shale interbedding. The formation is moderately well bedded; thin to flaggy, joints are moderately developed and abundant; closely spaced; steeply dipping; mostly open and have a blocky pattern, moderately resistant to weathering to a moderate depth; overlying mantle is thick, good surface drainage, weathered zone can be excavated with moderate ease; weathered rock is difficult; moderate to fast drilling rate.

A copy of the USGS Geological Map of the Sassamansville Quadrangle, indicating the site is included as Figure II.

4.3 SOILS

Soil records indicate the site soils to be of the following series:

> *UrxB – Urban land – Penn complex, 0 to 8 percent slopes*: This series consists of residuum weathered shale and siltstone with artificially covered areas such as pavements and buildings. A typical soil profile consists of the following:
>
> 0 to 6 inches: variable
> 0 to 8 inches: channery silt loam
> 8 to 21 inches: channery silt loam
> 21 to 34 inches: very channery silt loam
> 34 to 44 inches: bedrock

A copy of the USDA Soil Survey Website indicates the site is included as Figure III.

5. LABORATORY TESTING

Representative soil samples taken during the field exploration were tested in DBA's laboratory for basic engineering properties. The laboratory testing consisted of classification of soil samples for engineering purposes. The laboratory testing included Particle Size Analysis (ASTM D442), Plastic and Liquid Limits (ASTM D4318), and Natural Moisture Content (ASTM D2216). The Unified Soil Classification System (USCS) was used to assign group symbols and group names to the soils tested.

A summary of the test results is provided in Table I. A photocopy of the particle size analysis results and the plastic and liquid limit analysis results are included in the appendix of this report.

6. SUBSURFACE CONDITIONS

The results of the drilling program revealed a fairly consistent subsurface profile. Beneath 6 to 16 inches of topsoil or 3 inches of asphalt and 5 to 9 inches of subbase stone, the following strata can describe a typical soil profile.

Stratum IF: 0.5' to 4.0' thick; Fill consisting of orange-brown and reddish-brown fine sand and clayey silt with shale fragments. Portions of this fill include gray to brown organic silt (See test boring B6). This stratum is loose to medium dense with SPR[1] values ranging from 4 blow per foot (B/F) to 10 B/F. This stratum was encountered in three (3) of the test borings completed.

Stratum II: 1.75' to 7.0' thick: Reddish-brown and orange-brown fine sand and silt with some clay and shale fragments. This stratum is medium dense to dense with SPR values ranging from 15 B/F to over 100 B/F. The average SPR value is 49 B/F. This stratum was encountered in nine (9) of the test borings completed.

Stratum III: 4.17' to 13.0' thick: Weathered red shale. This stratum is dense to very dense with SPR values ranging from 28 B/F to over 100 B/F. The average SPR value for this stratum is 50 blows per 3 inches.

Bedrock: Shale bedrock was encountered in test borings completed at depths ranging from 6.58 feet to 16.33 feet below the existing grade, corresponding to rock surface elevations ranging from 198.41 feet to 209.64 feet. Dense weathered shale, as indicated by augering difficulty, was also encountered in nine of the test borings completed at depths ranging from 4.0 to 14.74 feet below the existing grade, corresponding to dense weathered rock elevations ranging from 199.39 feet to 213.84 feet. See Table IIA- Approximate Rock Elevation for information at each boring location.

Groundwater[2]: Groundwater was encountered in four of the test borings completed at depths ranging from 9.75 feet to 18.50 feet below the existing grade at elevations from 196.92 feet to 204.99 feet. See Table IIB – Approximate Groundwater Elevations for information at each boring location.

NOTES:

1. SPR = the Standard Penetration Resistance or number of blows required of a 140-pound hammer dropping 30", to drive a 2" OD split spoon sampler one foot.

2. The groundwater information provided is based on conditions encountered during the drilling program. Seasonal fluctuations in the groundwater table are to be expected.

7. GEOTECHNICAL ANALYSIS AND RECOMMENDATIONS

The results of our exploration indicate the presence of the following subsurface conditions:

- Existing fill soils
- Shallow depth to bedrock
- Shallow depth to groundwater

The drilling program encountered a 6 inch to 4-foot-thick deposit of existing fill (Stratum IF). This fill was intermittently encountered in three of the test borings completed (B2, B6, B9). It consists of a mixture of orange-brown and reddish-brown fine sand and clayey silt with shale fragments, and organic silt. This stratum is variable in strength and content, with SPR values ranging from 4 blows per foot (B/F) to 10 B/F. The native soil profile includes a layer of reddish-brown fine sand and silt with shale fragments (Stratum II). This layer then transitions to red weathered shale (Stratum III) at depths ranging from 2.67 feet to 8 feet below the existing grade.

Shale bedrock was encountered in nine of the borings completed. Depths to bedrock range from 6.58 feet to 16.33 feet below the existing grade at elevations from 198.41 feet to 209.64 feet. Dense weathered shale, as shown by augering difficulty, was also encountered in nine of the test borings completed at depths ranging from 4 to 14.74 feet below the existing grade at elevations of 199.39 feet to 213.84 feet. See Table IIA- Approximate Rock Elevation for information at each boring location.

Groundwater was encountered in four of the test borings completed at depths ranging from 9.75 feet to 18.50 feet below the existing grade at elevations from 196.92 feet to 204.99 feet. See Table IIB – Approximate Groundwater Elevations for information at each boring location.

The site conditions are suitable for the support of the proposed structure. A shallow foundation system with slab-on-grade construction is feasible, provided that the recommendations included herein are followed. DBA recommends a removal and replacement of stratum IF as noted in section 7.1A – Soil Replacement.

7.1 SITE PREPARATION

All deleterious materials including topsoil, root mass, trees and vegetation, asphalt and other materials determined in the field by the Geotechnical Engineer to be unsuitable shall be removed from all structural areas (buildings, pavements, and walkways) prior to placement of *structural fill*. Recycling of the asphalt and underlying stone can be accomplished on site if the asphalt is milled to a maximum 1-inch particle size and the material is used in the upper fill zones of pavement areas only. This fill is not suitable for other structural areas.

7.1A SOIL REPLACEMENT

Based on the conditions encountered during the completed test borings, DBA recommends the complete removal and replacement of the intermittent deposits of existing fill (Stratum IF) from within portions of two different building footprint areas. In addition, this removal shall extend beyond the building footprint for a minimum lateral distance equal to the removal depth to ensure adequate lateral stability. Once this material is removed, the exposed subgrade is to be proof rolled using a heavy (minimum 15-ton) smooth drum roller. This proof-roll shall be completed under the supervision of the Geotechnical Engineer. Any loose/soft zones identified shall be repaired to the satisfaction of the Geotechnical Engineer. Subgrade repair would typically include undercutting and/or the use of stabilization fabric or open-graded ballast. It is anticipated that this soil replacement procedure would include the southeast section of the existing press box/maintenance facilities building (Boring B2) at a maximum

depth of approximately 4 feet below the existing grade, and the northwest corner of the proposed visitor side concession stand and restroom building (See boring B9) at a depth of 3 feet. A fill deposit was found at the west end of the planned concession patio area (See boring B6), extending to a depth of 1.75 feet below the current grade. It is expected that this fill deposit may be removed during site grading, with a proof roll recommended to confirm that no soft spots remain.

7.2 FOUNDATIONS

Foundations shall bear on the undisturbed soils of Stratum II, Stratum III, or structural fill. Soft conditions encountered during foundation construction shall be excavated and replaced with structural fill. Refer to Section 7.7, Fill and Compaction Criteria.

Foundations shall be designed for a maximum soil bearing capacity of 4.0 KSF on Stratum II, Stratum III, or structural fill. If the column loads are to be revised during a re-design of the structure, the soil bearing capacity may need to be modified. DBA shall be notified of any significant changes in this regard.

Foundation settlements for the bearing capacities provided herein are to be within a tolerance of one inch total and a half-inch differential. It is anticipated that the bulk of this settlement will take place during the construction period. Settlements of this magnitude are within normal construction tolerances. In the event that more stringent settlement tolerances are required, a reduction of the allowable bearing capacity and/or a change in depth to bearing strata may be required.

To protect against differential settlements, foundations shall not be placed intermittently on soils and boulders. Small boulders encountered within or directly beneath the footing bearing surface shall be removed and replaced with *structural fill*. Larger boulders shall either be fully or partially removed and

replaced with *structural fill*. Trench excavation through areas containing boulders may require substantial over-excavation to facilitate boulder removal. Partial removal can be completed by splitting or hammering to a minimum of 12" below the footing bottom elevation. Boulder protrusion into the bottom or side of the proposed footing is not an acceptable condition. Boulders can be dislodged in bulk excavations.

Should foundation excavation encounter hard bedrock, the foundation is to be undercut a minimum of 12 inches. The undercut area is to be backfilled with a *structural fill* or a low strength flowable fill (max 500 psi) "cushioning" layer to limit the potential for differential foundation settlement and the development of stress concentrations caused by rock protrusion.

Exterior foundations or foundations in unheated areas shall be provided with a minimum of 36" compacted soil cover above the footing bottom for frost protection.

The variable soil conditions noted make it imperative that full-time Quality Control services are provided for all Geotechnical phases of this project.

7.2.1 SITE SEISMIC CONDITIONS

The 2021 edition of the International Building Code (IBC) specifies seismic design requirements applicable to the structural design of the proposed building. In particular, Chapter 16, Section 1613.2.2 is relevant to this structural design. This, in turn, requires that the project site be classified geotechnically as "Site Class" A through F, based on the Measured or Estimated Shear Wave Velocity Profile Table 20.3-1 Site Classification in Chapter 20 of ASCE 7.

ASCE Table 20.2-1
SITE CLASSIFICATION

SITE CLASS	Vs
A - Hard rock	>5,000 ft/s
B - Rock	>3,000 to 5,000 ft/s
BC Soft Rock	>2,100 to 3,000 ft/s
C - Very dense soil and soft rock	>1,450 to 2,100 ft/s
CD Dense Sand or Very Stiff Clay	>1,000 to 1.450 ft/s
D – Medium Dense Sand or Stiff Clay	>700 to 1,000 ft/s
DE Loose Sand or Medium Stiff Clay	>500 to 700 ft/s
E – Very Loose Sand or Soft Clay	<600 ft/s
F Soils requiring site response analysis in accordance with Section 21.1	See ASCE 7 Section 20.2.1

Vs = Shear Velocity, For SI: 1 ft/s = 0.3048 m/s

Comparing the criteria from Table 20.3-1 with the field data collected during the site exploration for this site on 3/27/2026, the subsurface profile has an estimated shear velocity within 5000 ft/s, and therefore, the site may be classified as Site Class "A" (Hard rock), for purposes of implementing the IBC 2021 seismic structural design requirements.

7.3 ROCK REMOVAL

Hard shale bedrock was encountered in nine of the borings completed from 6.58 feet to 16.33 feet below the existing grade at elevations from 198.41 feet to 209.64 feet. Dense weathered shale, as shown by augering difficulty, was also encountered in nine of the test borings completed at depths ranging from 4 to 14.74 feet below the existing grade at elevations of 199.39 feet to 213.84 feet. See Table IIA- Approximate Rock Elevation for information at each boring location. The hard bedrock encountered is not rippable using hydraulic rippers mounted on a bulldozer. It is expected that removing hard bedrock will require hydraulic hammers or explosives (if permitted by local authorities). A monitoring program

to record ground vibrations will be required. If blasting is required for changes or utility trenches, a monitoring program to record ground vibrations should be developed. DBA can develop and execute a program, if required and as directed by the Client, which may include blasting methods that increase the amount of shot rock reusable as structural fill.

The Geotechnical Engineer, during the excavating process, should verify areas and quantities of hard bedrock in the field. Excavation requiring hydraulic rippers or similar is considered rock excavation, however, it is generally less expensive than excavation of hard rock which requires blasting. A clear definition of rock should be included in any bid package.

7.4 SLAB ON-GRADE

The proposed slab-on-grade section for each of the planned buildings has an assumed thickness of 8 inches (4 inches of concrete and 4 inches of subbase stone). Existing grades around the existing football field are at approximately elevation 212.0 feet with grades sloping upward on the north side of the field (home side). It is presumed that the proposed building slab on grade elevations will approximately match the existing grades. Therefore, it is anticipated that the intermittent deposits of Stratum IF identified in the drilling program will remain in the range of 0.5 to 4.00 feet thick. Portions of this fill deposit which are in excess of 18 inches in thickness will need to be removed and replaced with structural fill(see Section 7.1A SOIL REPLACEMENT. Portions of this fill which are 18 inches thick or less and free of organic content shall be densified through proof rolling as described below.

Prior to the placement of fill the exposed slab subgrade areas shall be proof rolled with a heavy smooth drum roller (minimum 15-ton static weight) to detect the presence of loose or soft zones. This proof rolling operation shall be performed

in the proposed fill areas under the supervision of the Geotechnical Engineer. Proof rolling of the subgrade shall also be performed in the cut areas when the required grades have been achieved and immediately prior to pouring the floor slab. Loose or soft zones detected during the proof rolling operation shall be repaired to the satisfaction of the Geotechnical Engineer.

Based on the soil type encountered, standard penetration testing of the existing slab subgrade, and provided that all structural fill will be placed in accordance with the fill and compaction criteria set forth in Section 7.7, an estimated modulus of subgrade reaction of 150 psi/inch may be used for the design of slab sections. Should an increased modulus of subgrade reaction be required for the proposed design it is recommended that field or laboratory testing be completed to establish specific modulus values.

All slab subgrade areas shall be evaluated by the Geotechnical Engineer prior to pouring the slab so that repair can be completed. It is recommended that the slab be poured under roof during periods of harsh weather.

A smooth drum roller shall be made available to seal the subgrade in the event of predicted precipitation.

7.5 BACKFILL OF FOUNDATION AND UTILITY TRENCHES

All foundation and utility trenches shall be backfilled with *structural fill*, under the supervision of a Geotechnical Engineer (Refer to Section 7.7, Fill and Compaction Criteria).

7.6 PAVEMENTS AND WALKWAYS

Pavement and sidewalk areas shall be prepared in a manner similar to the slab on-grade areas. A minimum of 8 inches of crushed aggregate base shall be used beneath exterior pavements due to the frost heave potential of the subgrade soils. The pavement subgrade shall be graded to drain water from beneath the

pavement system to prevent ponding and subsequent pumping of silty subgrade soils.

For pavement design a preliminary estimated California Bearing Ratio (CBR) Value of 5.0 may be used for stabilized subgrade areas consisting of on-site silty sand with gravel (Stratum II and Stratum III) or Structural fill selected and placed in accordance with Section 7.7 of this report. Should anticipated heavy-duty pavement requirements or other project conditions require final site-specific CBR values, DBA can complete field and/or laboratory CBR testing of proposed subgrade soils at the client's request.

7.7 FILL AND COMPACTION CRITERIA

Fill supporting slabs, pavements, and foundations is considered herein to be *structural fill*. *Structural fill* shall be placed on an approved, proof rolled, nonyielding, level subgrade, in lifts not exceeding 8 inches (loose thickness), unless otherwise directed by the Geotechnical Engineer. *Structural fill* shall be maintained nominally at *Optimum Moisture Content* (ASTM D-698) and uniformly compacted to the percentages of *Maximum Dry Density* (ASTM D-698) provided in Table III - Compaction Criteria.

Suitable *structural fill* shall consist of clean soils without deleterious inclusions. On-site soils identified as Stratum II and Stratum *III* are acceptable for use as structural fill if given the opportunity to dry and are maintained nominally at Optimum Moisture Content. Samples retrieved from the upper 5 feet of the subgrade indicated moisture contents ranging from 4.90 to 13.74 percent. The optimum moisture content for compaction of these soils is estimated to range between 8 and 12 percent. Therefore, some of these soils may require aeration and drying prior to reusing them as structural fill, which is best accomplished in the summer months. Specific moisture content test results and

associated depths are indicated on the test boring logs in the appendix of this report.

Borrow fill shall be clean, well-graded soils with good strength characteristics, with a maximum particle size of 3 inches and containing not more than 20% silt/clay (by weight). Samples of on-site or borrowed sources of fill shall be submitted to the Geotechnical Engineer for testing at least 1 week before use on-site. A minimum of 65 lbs. or two (2) five-gallon buckets is required for testing.

7.8 LATERAL EARTH PRESSURES - RETAINING WALLS

The retaining/loading dock walls of the structure, if proposed, should be designed for an at rest condition (Ko). The foundations and walls must be fully drained to relieve potential hydrostatic pressure. A foundation/wall drainage system is recommended. Soil backfill around the basement walls shall be well compacted and should consist of granular soils to prevent the trapping of water.

Retaining walls outside the structure which are free to rotate should be similarly designed except with an active earth pressure as opposed to Ko condition. Soil parameters used to establish effective fluid pressures (excluding hydrostatic loads) and some additional parameters which may be used in the design of a retaining wall system are summarized in the following table:

SOIL PROPERTIES FOR DETERMINATION OF LATERAL LOADS

Parameter	**Stratum II**	**Stratum III**
Angle of Internal Friction, ϕ	32 degrees	35 degrees
Moist unit weight, γ_m	120 pcf	134 pcf
Active Earth Pressure Coefficient, K_a	0.31	0.27
Passive Earth Pressure Coefficient, K_p	3.25	3.69
At Rest Earth Pressure Coefficient, K_o	0.47	0.43
Soil/Mass concrete interface friction Angle, δ	21 degrees	23 degrees

8. QUALITY CONTROL

This report was prepared to provide design criteria for the design team. DBA assumes that Geotechnical and Construction Quality Control Services will be provided in order to implement the recommendations provided herein and to identify unanticipated or changed conditions. The Geotechnical Engineer's representative should review the consistency of the exposed soils with the conditions encountered by this exploration as described herein. Since localized loose and yielding subgrade conditions may be encountered between test locations, provisions for the undercutting and subsequent replacement of these materials should be anticipated in the construction documents. The environmental quality of the subgrade soils was not reviewed as part of this evaluation. All materials generated by grading and excavation shall be managed in accordance with regulatory requirements.

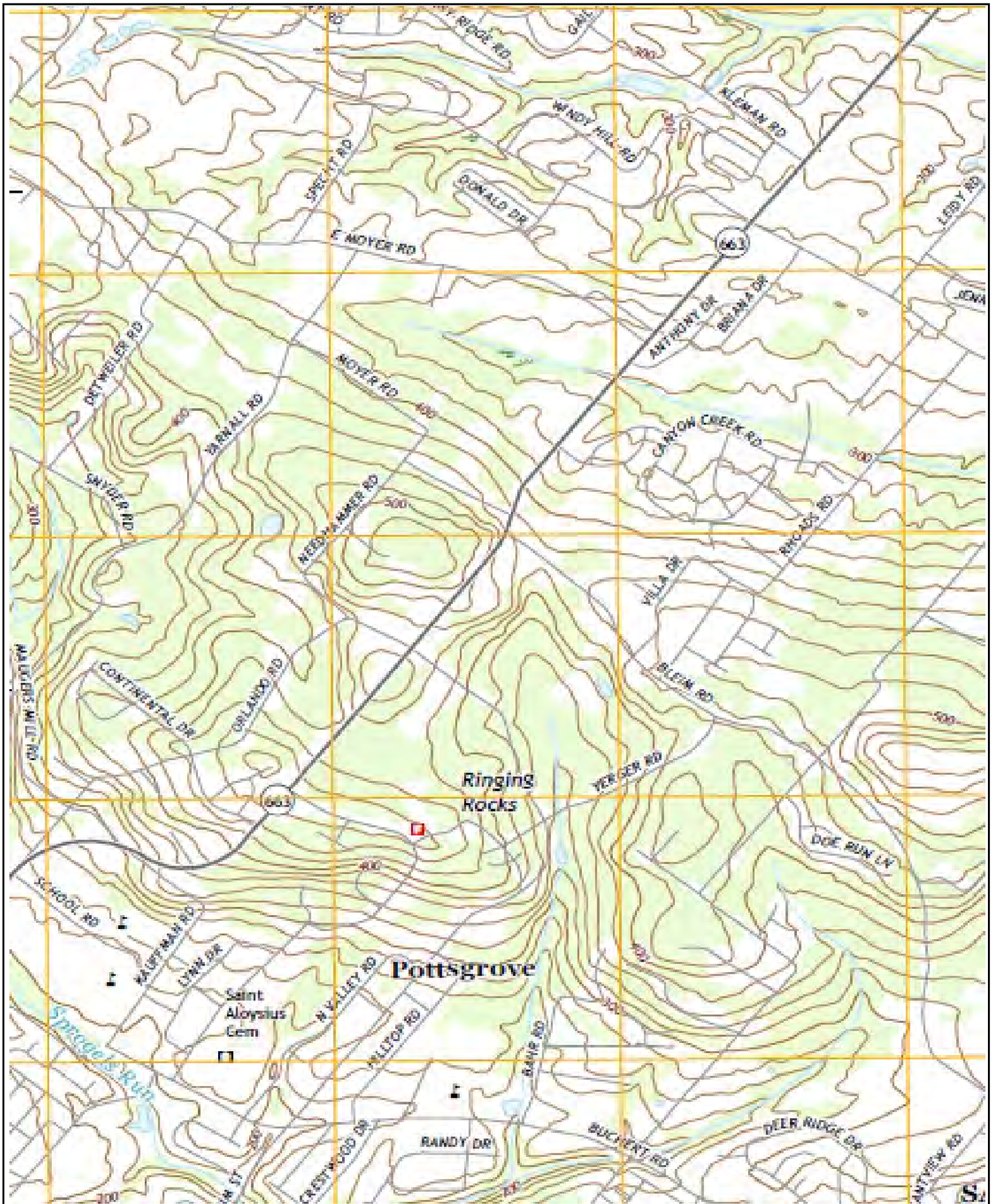
DBA can provide a contract for Geotechnical and Construction Quality Control Services (Special Inspections), as required. A pre-work meeting with the design professionals, contractors, and the Geotechnical Engineer is strongly recommended.

9. LIMITATIONS

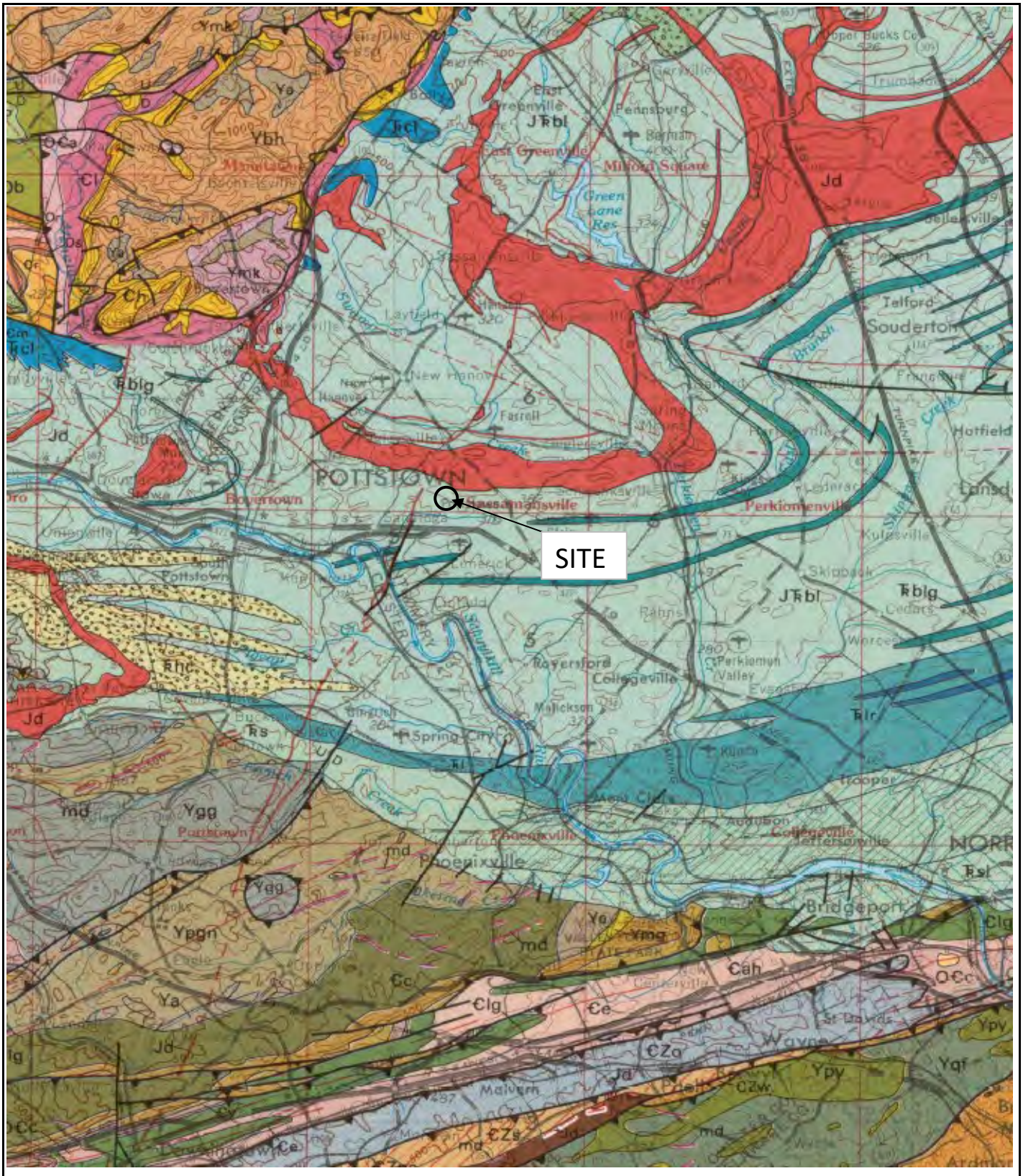
Services performed by DBA, including the Geotechnical Exploration, report, and any subsequent construction monitoring have been or will be conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other warranty or guarantee is indicated or intended in this report or any opinion, document or otherwise stated.

The recommendations included herein are based on the conditions encountered by the test borings performed at the subject site. It is noted that, although soil quality has been inferred from the interpolation of the site sampling data, subsurface conditions beyond the test borings are, in fact, unknown. As a result, these recommendations may require modifications based on the conditions encountered and exposed during construction excavation. Should any conditions encountered during construction differ from those described in the report, this office should be notified immediately in order to review and possibly modify the recommendations included in this report.

FIGURES AND TABLES



GEOTECHNICAL & ENVIRONMENTAL ENGINEERS	**Project 5813G1**
DAVID BLACKMORE & ASSOC., INC. **3335 West Ridge Pike** **Pottstown, Pennsylvania 19464** Telephone: (610) 495-6255 FAX: (610) 495-7353	**Figure I** **SITE LOCATION & TOPOGRAPHY** U.S.G.S. 7.5 Minute Topographic Quadrangle Sassamansville Quadrangle



KEY

TrB - Brunswick Formation

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DAVID BLACKMORE & ASSOC., INC. **3335 West Ridge Pike** **Pottstown, Pennsylvania 19464** Telephone: (610) 495-6255 FAX: (610) 495-7353	**Figure II** **SITE GEOLOGY** USGS Geologic Northeast Corridor Report



KEY

UrxB - urban Land - Penn complex, 0 to 8 percent slopes

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DAVID BLACKMORE & ASSOC., INC. **3335 West Ridge Pike** **Pottstown, Pennsylvania 19464** Telephone: (610) 495-6255 FAX: (610) 495-7353	**Figure III** **Soils** Soil Mappig via USDA Natural Resources Conservation Service

TABLE I
LABORATORY TEST RESULTS

BORING #	B1 B3	B6 B1	B4 B9
SAMPLE #	S-2 S-1	S-4 S-3	S-1 S-2
DEPTH	4' – 6' 2' – 4'	10' – 12' 8' – 10'	2' – 4' 4' – 6'
STRATUM	II	III	II
NMC* (%)	11.65 8.67	5.35 4.90	9.21 13.74

* NMC = Natural Moisture Content

SOIL PARTICLE SIZE DISTRIBUTION

SIEVE #	**PERCENT PASSING BY WEIGHT**		
3/4"	100.0	100.0	100
3/8"	91.5	83.7	89.5
4	76.9	63.1	75.0
10	63.7	43.5	58.7
40	46.1	24.3	39.4
100	39.6	16.9	33.5
200	36.8	14.9	31.3

ATTERBERG LIMIT ANALYSIS

LL*	N/A	N/A	N/A
PL*	N/A	N/A	N/A
PI*	N/A	N/A	N/A

* LL = Liquid Limit; PL = Plastic Limit; PI = Plasticity Index

USCS CLASSIFICATION

Eng. Class.	SM	SM	SM
Descr.	Silty sand with gravel	Silty sand with gravel	Silty sand with gravel

TABLE I (CONT'D)
LABORATORY TEST RESULTS

BORING #	B2	B9
SAMPLE #	S-1	S-1
DEPTH	2' – 4'	2' – 4'
STRATUM	IF	IF
NMC* (%)	21.98	12.08
ORG (%)**	N/A-	N/A

* NMC = Natural Moisture Content

** ORG = Organic Silt Content

TABLE IIA
APPROXIMATE ROCK ELEVATIONS

Boring Number	Surface Elevation	Depth to Dense Weathered Rock[1]	Dense Weathered Rock Elevation	Depth to Bedrock[2]	Bedrock Elevation
B1	211.39 feet	12.0 feet	199.39 feet	12.17 feet	199.22 feet
B2	214.74 feet	14.75 feet	199.99 feet	15.83 feet	198.91 feet
B3	213.74 feet	5.50 feet	208.24 feet	15.33 feet	198.41 feet
B4	215.49 feet	11.58 feet	203.91 feet	11.75 feet	203.74 feet
B5	214.93 feet	4.0 feet	210.93 feet	14.83 feet	200.10 feet
B6	217.18 feet	8.0 feet	209.18 feet	16.33 feet	200.85 feet
B7	218.77 feet	9.50 feet	209.27 feet	10.25 feet	208.52 feet
B8	219.31 feet	9.50 feet	209.81 feet	9.67 feet	209.64 feet
B9	215.42 feet	<21.0 feet	<194.42 feet	N/E	N/A
B10	215.51 feet	1.67 feet	213.84 feet	6.58 feet	208.93 feet

NOTES:
Surface elevations at each boring location were determined in the field using a Trimble GPS Rover.

[1] As determined by drilling difficulty and Standard Penetration Resistance data.
[2] As determined by auger refusal.

TABLE IIB
APPROXIMATE GROUNDWATER ELEVATIONS

Boring Number	Surface Elevation	Depth to Groundwater	Groundwater Elevation[3]
B2	214.74 feet	9.75 feet	204.99 feet
B5	214.93 feet	12.42 feet	202.51 feet
B6	217.18 feet	12.67 feet	204.51 feet
B9	215.42 feet	18.50 feet	196.92 feet

[3] Groundwater information is based on conditions encountered during the field exploration. Seasonal fluctuation in groundwater elevation shall be expected.

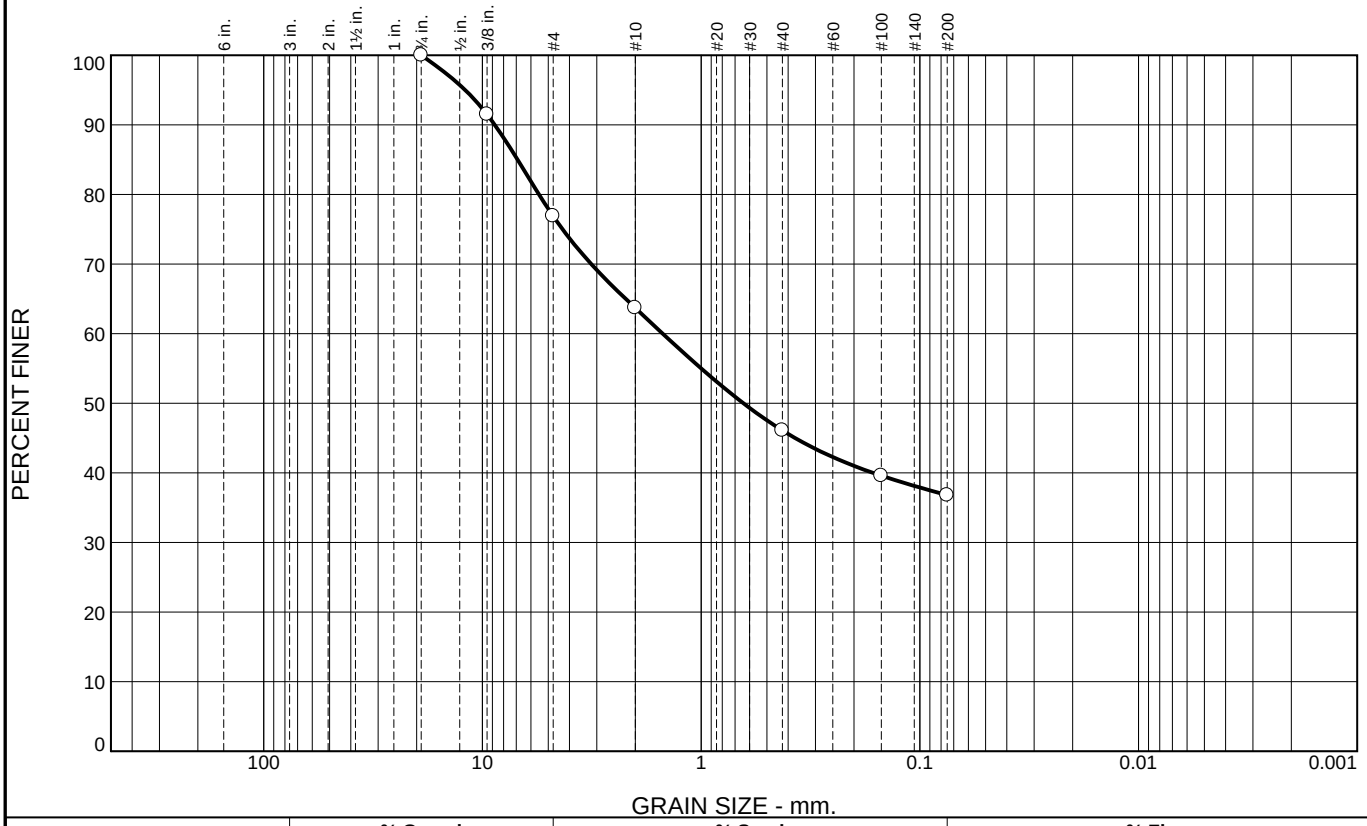
TABLE III
COMPACTION CRITERIA

LOCATION	PERCENT COMPACTION (ASTM-D698)
Foundations	98%
Floor Slabs	98%
Pavements	95%
Berms (non-structural)	93%

APPENDIX

SOIL PARTICLE SIZE ANALYSIS RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	23.1	13.2	17.6	9.3	36.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	91.5		
#4	76.9		
#10	63.7		
#40	46.1		
#100	39.6		
#200	36.8		

* (no specification provided)

Material Description

Red to dark red weathered shale.
(silty sand with gravel)

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 8.7798 D_{85}= 6.9098 D_{60}= 1.4980
D_{50}= 0.6402 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-4(0)

Remarks

B1/S2 as received moisture content of 11.65%.
B3/S1 as received moisture content of 8.67%.

Source of Sample: B1/B3 **Depth:** 2'-6'
Sample Number: S2/S1

Date: 5/15/2026

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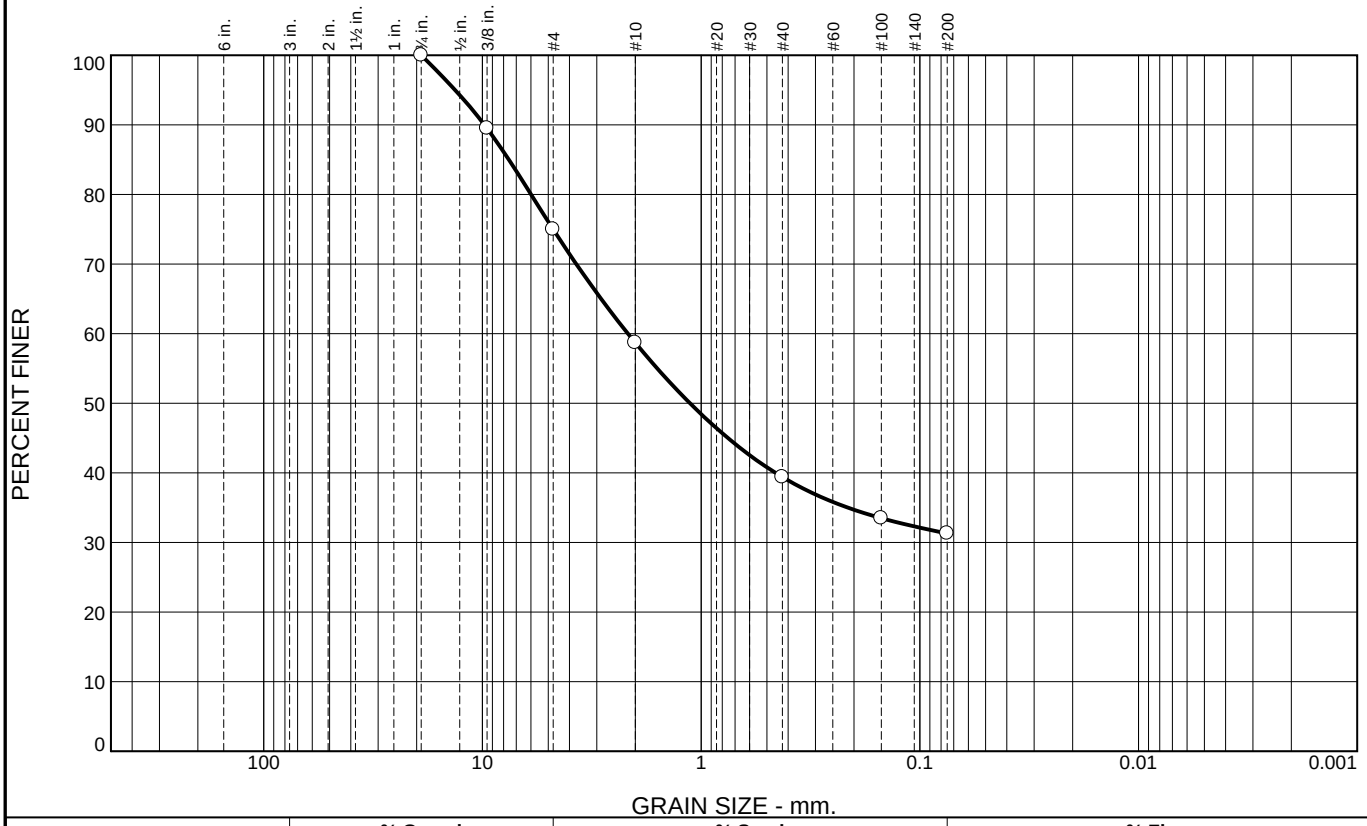
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Client: Pottsgrove School District C/O CMTA
Project: Pottsgrove High School Stadium

Project No: 5813G1 **Plate**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	25.0	16.3	19.3	8.1	31.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	89.5		
#4	75.0		
#10	58.7		
#40	39.4		
#100	33.5		
#200	31.3		

* (no specification provided)

Material Description

Red to dark red weathered shale with traces of clay.
(silty sand with gravel)

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 9.7915 D_{85}= 7.5738 D_{60}= 2.1610
D_{50}= 1.1241 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

B4/S1 as received moisture content of 9.21%.
B9/S2 as received moisture content of 13.74%.

Source of Sample: B4/B9 **Depth:** 2'-6'
Sample Number: S1/S2

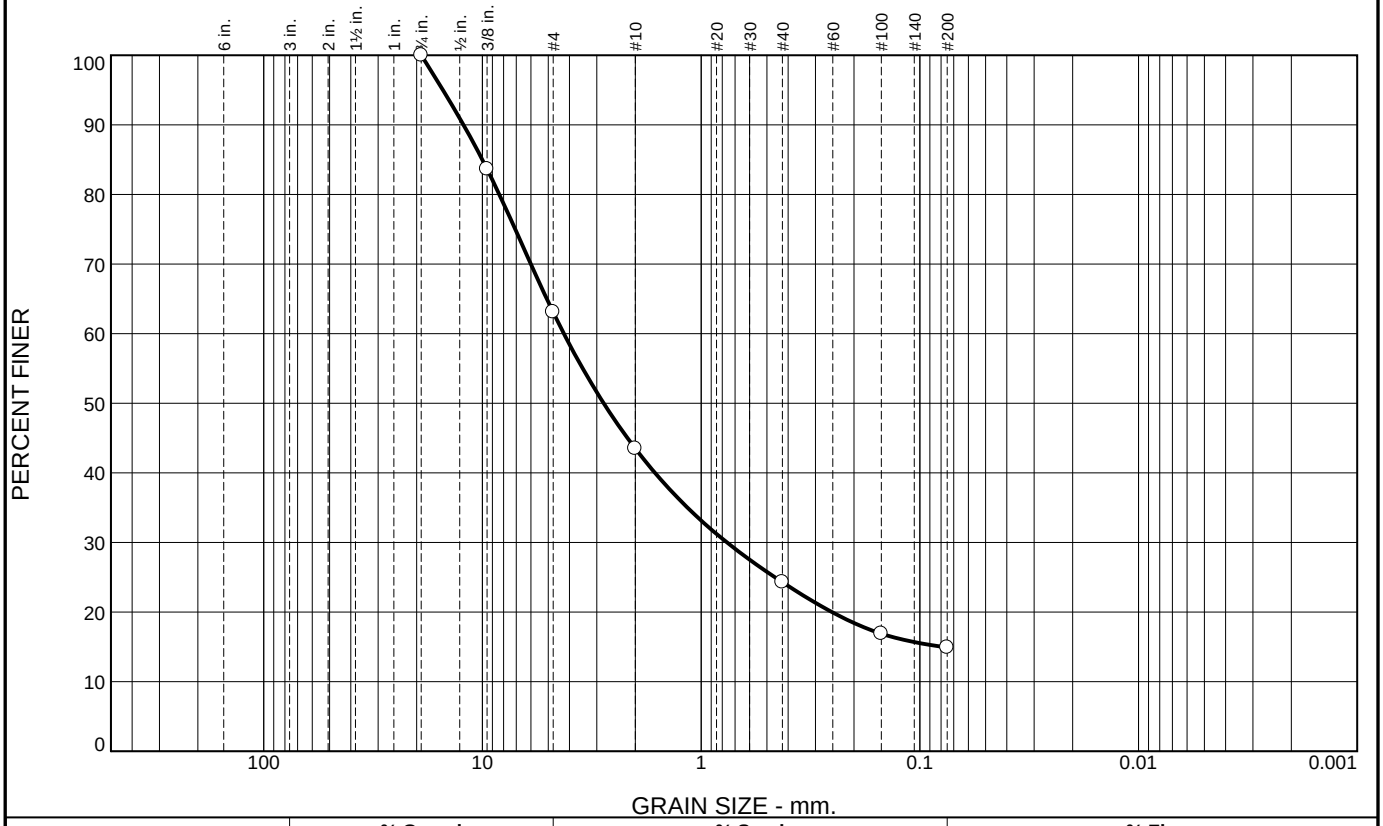
Date: 5/15/2026

DAVID BLACKMORE & ASSOCIATES, INC.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Client: Pottsgrove School District C/O CMTA
Project: Pottsgrove High School Stadium

Project No: 5813G1 **Plate**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	36.9	19.6	19.2	9.4	14.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	83.7		
#4	63.1		
#10	43.5		
#40	24.3		
#100	16.9		
#200	14.9		

* (no specification provided)

Material Description

Red to dark red weathered shale.
(silty sand with gravel)

Atterberg Limits

PL= NP LL= NV PI=

Coefficients

D_{90}= 12.2082 D_{85}= 10.0138 D_{60}= 4.2409
D_{50}= 2.7894 D_{30}= 0.7615 D_{15}= 0.0786
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-a

Remarks

B6/S4 as received moisture content of 5.35%.
B1/S3 as received moisture content of 4.90%.

Source of Sample: B6/B1 **Depth:** 9'-14'4"
Sample Number: S4/S3

Date: 5/15/2026

DAVID BLACKMORE & ASSOCIATES, INC.
GEOTECHNICAL & ENVIRONMENTAL ENGINEERS

Client: Pottsgrove School District C/O CMTA
Project: Pottsgrove High School Stadium

Project No: 5813G1 **Plate**

TEST BORING LOGS

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B1

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 12.17'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/28/2026
Inspected By: AYM
Boring Depth: 12.17'
Ground Surface Elevation (ft msl): 211.39
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): Dry (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	LITHOLOGY: DEPTH (FT)	LITHOLOGY: ELEVATION (FT)	SAMPLING DATA: NUMBER	SAMPLING DATA: Water Content	SAMPLING DATA: SPT DATA	SAMPLING DATA: SPT Value	SAMPLING DATA: SPT GRAPH (Blows Per Foot)
0			Topsoil (12")	1.00	210.39		10 20 30 40			10 20 30 40 60 80
			Stratum II Reddish-brown fine sand and silt with some shale fragments			S-1*		4-8-12-18	20	
3						S-2*		9-13-25-29	38	
6				8.00	203.39					
			Stratum III Weathered red shale			S-3		32-50/3"	100	
9										
12				12.17	199.22					
			Auger Refusal on Shale bedrock							
15										
18										
21										

Notes:
*Moist
Hard augering from 9.75'
Very hard augering from 12'

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B2

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 15.83'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/28/2026
Inspected By: AYM
Boring Depth: 15.83'
Ground Surface Elevation (ft msl): 214.74
Water Level - Immediate (ft bgs): 14.50' (5 min)
Water Level - Static (ft bgs): 9.75' (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	LITHOLOGY: DEPTH (FT)	LITHOLOGY: ELEVATION (FT)	SAMPLING DATA: NUMBER	SAMPLING DATA: Water Content	SAMPLING DATA: SPT DATA	SAMPLING DATA: SPT Value	SAMPLING DATA: SPT GRAPH (Blows Per Foot)
0			Topsoil (6")	0.50	214.24		10 20 30 40			10 20 30 40 60 80
			Stratum IF Fill consisting of range-brown fine sand and clayey silt with occasional rock fragmnets							
3				3.42	211.32	S-1*		1-2-2-8	4	
			Fill consisting of reddish-brown fine sand and silt with occasional shale fragments	4.67	210.07					
			Stratum II Orange-brown and reddish-brown fine sand and silt, some clay with occasional shale fragments			S-2**		10-14-18-22	32	
6			Reddish-brown fine sand and silt with shale fragments							
9	▼					S-3		47-50/3"	100	
				10.00	204.74					
			Stratum III Weathered red shale							
12										
	▽					S-4		31-50/3"	100	
15				15.83	198.91					
			Auger Refusal on Shale bedrock							
18			Notes: *Very Moist **Moist Fairly hard augering from 9.75' Hard augering from 14.75'							
21										

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B3

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 15.33'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/28/2026
Inspected By: AYM
Boring Depth: 15.33'
Ground Surface Elevation (ft msl): 213.74
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): Dry (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	DEPTH (FT)	ELEVATION (FT)	NUMBER	Water Content 10 20 30 40	SPT DATA	SPT Value	SPT GRAPH (Blows Per Foot) 10 20 30 40 60 80
0			Topsoil (16")							
				1.33	212.41					
			Stratum II	1.50	212.24					
			Orange-brown fine sand and silt trace of clay							
3			Reddish-brown fine sand and silt with some shale fragments	3.25	210.49	S-1		8-21-43-50/3"	64	
			Stratum III							
			Weathered red shale			S-2		36-50/5"	100	
6										
9						S-3		50/3"	100	
12										
						S-4		50/1"	100	
15				15.33	198.41					
			Auger Refusal on Shale bedrock							
18										
21										

Notes:
Hard augering from 5.5'

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water level. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B4

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 15.33'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/28/2026
Inspected By:
Boring Depth: 11.75'
Ground Surface Elevation (ft msl): 215.49
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): Dry (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	DEPTH (FT)	ELEVATION (FT)	NUMBER	Water Content 10 20 30 40	SPT DATA	SPT Value	SPT GRAPH (Blows Per Foot) 10 20 30 40 60 80
0			Topsoil (13")	1.07	214.42					
			Stratum II Orange-brown fine sand and clayey silt	2.58	212.91					
3			Reddish-brown and gray fine sand and clayey siltwith shale fragments			S-1*		9-10-21-37	31	
				4.58	210.91	S-2		20-50/5"	100	
			Stratum III Weathered red shale							
6										
9						S-3		28-50/4"	100	
				11.75	203.74					
12			Auger Refusal on Shale bedrock							
15										
18										
21										

Notes:
*Moist
Hard augering from 10'
Very hard augering from 11.58'

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B5

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 14.83'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/27/2026
Inspected By: AYM
Boring Depth: 14.83'
Ground Surface Elevation (ft msl): 214.93
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): 12.42 (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	LITHOLOGY: DEPTH (FT)	LITHOLOGY: ELEVATION (FT)	SAMPLING DATA: NUMBER	SAMPLING DATA: Water Content	SAMPLING DATA: SPT DATA	SAMPLING DATA: SPT Value	SAMPLING DATA: SPT GRAPH (Blows Per Foot)
0			Asphalt (3") Modified stone (5")	0.67	214.26		10 20 30 40			10 20 30 40 60 80
			Stratum II Reddish-brown fine sand and silt with many shale fragments	2.67	212.26					
3			Stratum III Weathered red shale			S-1		11-19-34-50/3"	53	
						S-2		50/5"	100	
6										
9						S-3		50/3"	100	
12	▼									
						S-4		50/1"-N.R.	100	
				14.83	200.10					
15			Auger Refusal on Shale bedrock							
			Notes: Hard augering from 4'							
18										
21										

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B6

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 16.33'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/27/2026
Inspected By: AYM
Boring Depth: 16.33'
Ground Surface Elevation (ft msl): 217.18
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): 12.67 (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	DEPTH (FT)	ELEVATION (FT)	NUMBER	Water Content 10 20 30 40	SPT DATA	SPT Value	SPT GRAPH (Blows Per Foot) 10 20 30 40 60 80
0			Asphalt (3") Modified Stone (7")	0.83	216.35					
			Stratum IF Fill consisting of brown and gray organic silt	1.42	215.76					
			Stratum II Orange-brown fine sand and silt Reddish-brown fine sand and silt with many shale fragments	2.42	214.76	S-1		4-6-9-15	15	
3						S-2		14-16-29-23	45	
			Stratum III Weathered red shale	5.00	212.18					
6										
9						S-3		50/3"	100	
12	▼									
						S-4		50/3"	100	
15										
				16.33	200.85					
			Auger Refusal on Shale bedrock							
18			Notes: Fairly hard augering from 7' hard augering from 8'							
21										

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B7

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 10.25'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/27/2026
Inspected By: AYM
Boring Depth: 10.25'
Ground Surface Elevation (ft msl): 218.77
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): Dry (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	LITHOLOGY: DEPTH (FT)	LITHOLOGY: ELEVATION (FT)	SAMPLING DATA: NUMBER	SAMPLING DATA: Water Content	SAMPLING DATA: SPT DATA	SAMPLING DATA: SPT Value	SAMPLING DATA: SPT GRAPH (Blows Per Foot)
0			Asphalt (3") Modified stone (9")	1.00	217.77		10 20 30 40			10 20 30 40 60 80
			Stratum II Reddish-brown fine sand and silt with some shale fragments	2.75	216.02					
3			Stratum III Weathered red shale			S-1		16-19-30-44	49	
						S-2		30-26-50/3"	100	
6										
9						S-3		50/1"	100	
				10.25	208.52					
			Auger Refusal on Shale bedrock							
12			Notes: Hard augering from 5.25' Very hard augering from 9.5'							
15										
18										
21										

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B8

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 9.67'
Drilling Method #2:

Project Number: 5813G1
Date Drilled: 3/27/2026
Inspected By: AYM
Boring Depth: 9.67'
Ground Surface Elevation (ft msl): 219.31
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): Dry (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	DEPTH (FT)	ELEVATION (FT)	NUMBER	Water Content 10 20 30 40	SPT DATA	SPT Value	SPT GRAPH (Blows Per Foot) 10 20 30 40 60 80
0			Topsoil (6")	0.50	218.81					
			Stratum II Reddish-brown fine sand and silt with many shale fragments	3.00	216.31	S-1		25-44-50/5"	100	
3			**Stratum III** Weathered red shale			S-2		23-50/5"	100	
6										
9				9.67	209.64	S-3		50/1"	100	
			Auger Refusal on Shale bedrock							
12			Notes: Hard augering from 6' Very hard augering from 9.5'							
15										
18										
21										

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B9

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 19'
Drilling Method #2: Split Spoon from 19' to 21'

Project Number: 5813G1
Date Drilled: 3/27/2026
Inspected By: AYM
Boring Depth: 21'
Ground Surface Elevation (ft msl): 215.42
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): 18.5' (5 Hrs)

DEPTH BELOW SURFACE (FT)	LITHOLOGIC SYMBOL	GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	DEPTH (FT)	ELEVATION (FT)	NUMBER	Water Content (10 20 30 40)	SPT DATA	SPT Value	SPT GRAPH (Blows Per Foot) (10 20 30 40 60 80)
0		Asphalt (3") Modified stone (4")	0.58	214.84					
		Stratum IF Fill consisting of reddish-brown fine sand and clayey silt with some shale fragments	3.00	212.42	S-1*		8-10-11-12	21	
4		**Stratum II** Reddish-brown fine sand and clayey silt with black argilite fragments and some shale fragments			S-2*		12-17-20-21	37	
8		**Stratum III** Weathered red shale	8.00	207.42	S-3**		9-12-16-20	28	
12									
					S-4		10-13-17-21	30	
16									
20					S-5		19-20-18-20	38	
			21.00	194.42					
		BORING TERMINATED							
24									
28									

Notes:
*Moist
**Damp

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

DAVID BLACKMORE & ASSOCIATIES, INC.
Geotechnical & Environmental Engineers
Phone: 610-495-6255 Fax: 610-495-7353
www.dbaengineering.com

Boring Number: B10

Project: Pottsgrove High School Stadium
Location: 1301 Kauffman Road
Twp/City/State: Pottstown/ Montgomery County/ PA
Drilling Contractor: Corcoran Drilling Co. Inc.
X Coordinate (ft): Y Coordinate (ft):
Drilling Method #1: Solid Auger from 0' to 6.33'
Drilling Method #2:

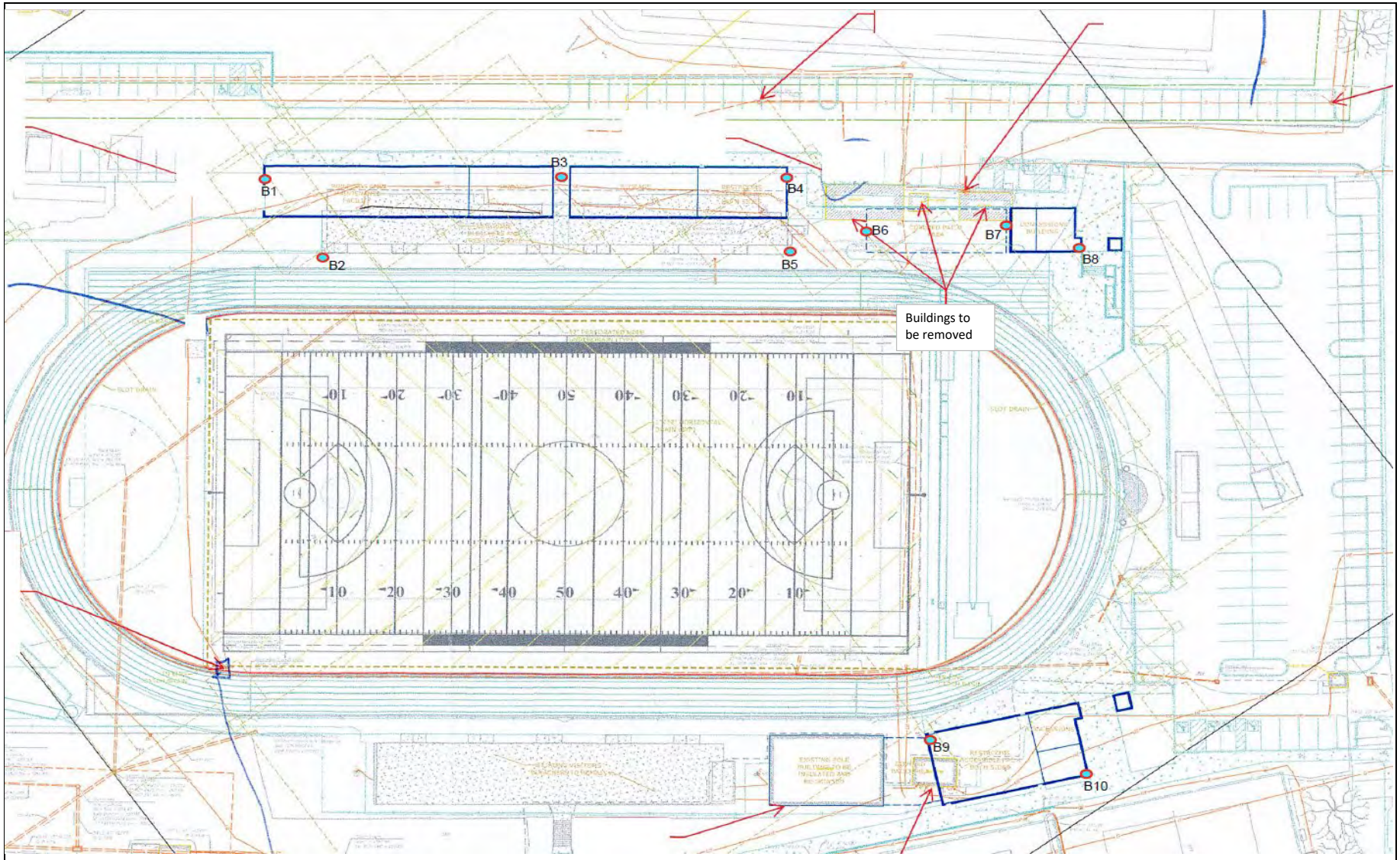
Project Number: 5813G1
Date Drilled: 3/27/2026
Inspected By: AYM
Boring Depth: 6.58'
Ground Surface Elevation (ft msl): 215.51
Water Level - Immediate (ft bgs): Dry (5 min)
Water Level - Static (ft bgs): Dry (5 Hrs)

DEPTH BELOW SURFACE (FT)	WATER LEVEL	LITHOLOGY: LITHOLOGIC SYMBOL	LITHOLOGY: GEOLOGIC DESCRIPTION OF SOIL AND ROCK STRATA	LITHOLOGY: DEPTH (FT)	LITHOLOGY: ELEVATION (FT)	SAMPLING DATA: NUMBER	SAMPLING DATA: Water Content	SAMPLING DATA: SPT DATA	SAMPLING DATA: SPT Value	SAMPLING DATA: SPT GRAPH (Blows Per Foot)
0			Topsoil (8")	0.67	214.84					
			Stratum III Weathered red shale			S-1		50/3"	100	
3						S-2		50/1"	100	
6				6.58	208.93					
			Auger Refusal on Shale Bedrock							
9			Notes: Hard augering from 1.67' Very hard augering from 6.25' 1st attempt: Auger refusal at 6.33' 2nd attempt: Moved 10' towards B9 Hard augering from 2' Auger refusal at 6.58'							
12										
15										
18										
21										

Water Content: 10 20 30 40
SPT GRAPH (Blows Per Foot): 10 20 30 40 60 80

The boring results represent subsurface conditions at the boring locations only and are not necessarily representative of conditions at other locations. Water levels are taken at the time of drilling and are not indicative of seasonal variations in the ground water lovel. NR = No Recovery, S = Split Spoon sample (2" O.D.), C = Rock Coring Run.

TEST BORING LOCATION PLAN



KEY	GEOTECHNICAL & ENVIRONMENTAL ENGINEERS	Project 5813G1
TEST BORING	*DAVID BLACKMORE & ASSOC., INC.* **3335 West Ridge Pike** **Pottstown, Pennsylvania 19464** Telephone: (610) 495-6255 FAX: (610) 495-7353	**POTTSGROVE STADIUM** **TEST BORING LOCATION PLAN** 1301 Kauffman Road Pottsgrove Twp, Montgomery County, PA

INFILTRATION TEST PIT LOCATIONS

TEST PIT #	EXISTING ELEV:	1ST TEST ELEV:	2ND TEST ELEV:	BOTTOM PIT ELEV:	LATITUDE:	LONGITUDE:	NORTHING:	EASTING:
#1	212	208	206	204	N40.265997	-W75.621837	346912.0840	2562334.1602
#2	207	203	201	199	N40.266420	-W75.622396	347062.2037	2562174.3816
#3	216	212	210	208	N40.266924	-W75.623084	346874.6252	2561993.6384
#4	215	211	209	207	N40.265204	-W75.622545	346619.1492	2562148.7250
#5	213.5	209.5	207.5	205.5	N40.264936	-W75.623396	346514.9335	2561908.6285
#6	208.5	204.5	202.5	200.5	N40.264999	-W75.623770	346535.3874	2561803.6806
#7	215.25	210.25	209.25	207.25	N40.265609	-W75.622781	346764.3520	2562074.2967
#8	215.55	210.55	209.55	207.55	N40.265427	-W75.622471	346700.2923	2562162.3011
#9	214.75	209.75	208.75	206.75	N40.265784	-W75.622607	346829.3364	2562121.3246
#10	214.90	209.90	208.90	206.90	N40.265603	-W75.622297	346765.2766	2562209.3290

TP-1
TP-2
TP-3
TP-4
TP-5
TP-6
TP-7
Bedrock @ 207.25' (8'); Mottling @ 211.25 (4'); Testing @ 213.25' (2')
TP-8
No bedrock @ 207.55' (8'); Mottling @ 209.55 (6'); Testing @ 211.55' (4')
TP-9
Bedrock @ 209.25' (5.5'); Testing @ 211.25' (3.5') & 213.25 (1.5')
TP-10
Bedrock @ 207.4' (7.5'); Testing @ 209.4' (5.5') & 211.4' (3.5')

20' Wide Sanitary "Sewer Easement B" Lower Pottsgrove Township Municipal Authority Recorded in Plan Book 40, Page 403

SPROGELS RUN (APPROXIMATE CENTERLINE)
CO. COMMERCIAL-OFFICE DISTRICT
R-2, RESIDENTIAL DISTRICT
Softball Field
Football Field
Backstop Fence
6' High Chain-Link Fence
Dugout
Scoreboard (SEE ELECTRICAL DWGS)
Turf Tank
Flag Pole
Warning Track
Rip-Rap
Bullpen Area
Trailer
Stone
Macadam
Press Box
Bleachers
Steps (Typ.)
Gate
Garage
Shed
Building
Stone Driveway
"Dog Waste" Sign
"No Parking" Sign
SAWCUT
Location Of Stormsewer Marked By TLG (Pipe Size/Type Undetermined)
Yard Drain Grate = 214.25 (1 Inv = (-) Inv =
Yard Drain Grate = 214.34 8" RCP Inv = 212.84
8" RCP
Perimeter Trench Drain Grate = 214.66 Inv = 213.96
Track Edge
Edge Of Play Field Line
EXISTING TRACK TO BE DEMOLISHED
Possible 12" RCP (Determined By SUE, Not Survey Verified) Yard Drain Grate = 214.23 12" RCP Inv = 209.03
12" RCP
Yard Drain Grate = 214.34 8" RCP (NE) Inv = 211.79 12" RCP (SW) Inv = 211.54
4' High Chain-Link Fence
152 Lf. 12" RCP @ 1.64%
166 Lf. 12" RCP @ 5.72%
163 Lf. 12" RCP @ 1.94%
Yard Drain Grate = 214.57 Inv = 213.87
Edge
Shrub (Typ.)
Bleachers
Sand Pits
Yard Drain Grate = 214.02 6" SLCPP Inv = 213.02
Yard Drain Grate = 214.02 6" SLCPP Inv = 212.02
Yard Drain Grate = 213.32 12" RCP Inv = 211.82
6" SLCPP
Ticket Booth
Double Swing Gate
12' Wide Macadam Drive
6' High Chain-Link Fence
Location Of Waterline (Irrigation) Marked By TLG (Non-Typical Boxes Used)
Perimeter Trench Drain Grate = 214.40 Inv = 213.70
Approximate Possible Location of Storm Manhole As Shown In Inst. 2019080693 (Not Survey Located)
15" RCP
Building
Ramp
Outfall = 211.57
Outfall = 209.04
Edge Of Macadam Surface
Grate = 213.38 Inv = 212.38
Grate = 210.70 Inv = 209.70
Bench Landscape Timbers w/Stone Fill
Depressed Curb
Bump Sign
"Stop" Sign
"Do Not Enter" Sign
Not Enter" Sign
Encased Bulletin Board
LIMIT OF DISTURBANCE REMOVAL
Trespassing
Limit Of Topographic Survey Completed October, 2025
Approximate Location of Gas Line Shown in Recorded Plans (Not Survey Verified)
156 Lf. 30" SLCPP
33 Lf. 30" SLCPP @ 1.33%
MATCHLINE
UrxB
RhB
PeC

GRAPHIC SCALE
0 15 30 60
SCALE: 1" = 30'

K&W
DESIGNING ENVIRONMENTS
2201 North Front Street, Suite 200
Harrisburg, PA 17110
P: 717.635.2835
www.kandweng ineers.com

INFILTRATION TESTING PLAN
PRELIMINAYR INFILTRATION PLAN
FOR
POTTSGROVE SCHOOL DISTRICT
LOWER POTTSGROVE TOWNSHIP
MONTGOMERY COUNTY, PA

PROFESSIONAL SEAL

SCALE:
DATE: JANUARY 6, 2026
K&W PROJECT: 2402.001
DRAWN BY:
CAD DRAWING: 2402.001 Infiltration Plan 2026-05-26.dwg

REVISIONS NO.	DATE	DESCRIPTION
1		
2		
3		
4		
5		
6		
7		

PLAN TYPE:
PRELIMINARY INFILTRATION TESTING PLAN

SHEET:
1 OF 1

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-1**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **2/17/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 37º**

Test Pit Elevation **±212 FT**

Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.66'	Brown to Dark Brown Sandy Silt	**Topsoil**	
2			0.66' - 2.5'	Red Brown Sandy Gravel and Cobble, Highly Weathered Shale Bedrock (HWSB)	**Stratum II**	2
			-Bucket Refusal @ 2.5 Feet-			
4			**-End of Test Pit @ 2.5 Feet-**			4
6						6
8						8
10						10
12						12
14						14

Initial Water Level
Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-2**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **2/18/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 38º**

Test Pit Elevation **±207 FT**

Groundwater
Yes [X] No [ ]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.66'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.66' - 2.0'	Brown to Red Brown Silty Clay, increaseing Gravel w/ depth		
2					**Stratum I**	2
		▼	2.0' - 3.5'	Red Brown Sandy Gravel and Cobble, Highly Weathered Shale Bedrock (HWSB)	**Water @ 2.5'**	
					Stratum II	
4			**-Bucket Refusal @ 3.5 Feet-**			4
			-End of Test Pit @ 3.5 Feet-			
6						6
8						8
10						10
12						12
14						14

▼ Initial Water Level
▽ Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-3**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **2/18/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 40º**

Test Pit Elevation **±216 FT**

Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.66'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.66' - 4.5'	Brown Silt with Gravel		
2						2
4						4
					Stratum I	
			4.5' - 6.0'	Red Brown Sandy Gravel and Cobble, Highly Weathered Shale Bedrock (HWSB)		
6					**Stratum II**	6
			-Bucket Refusal @ 6.0 Feet-			
			-End of Test Pit @ 6.0 Feet-			
8						8
10						10
12						12
14						14

Initial Water Level
Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-4**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **2/17/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 39º**

Test Pit Elevation **±215 FT**

Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions	Remarks	Depth (Ft.)
			0.0'- 0.66' Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.66' - 6.0' Brown to Red Brown Silty Clay, trace Gravel		
2					2
4					4
6				**Stratum I**	6
			-End of Test Pit @ 6.0 Feet-		
8					8
10					10
12					12
14					14

Initial Water Level
Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-5**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **2/17/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 41º**

Test Pit Elevation **±213.5 FT**
Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions	Remarks	Depth (Ft.)
			0.0'- 1.0' Brown to Dark Brown Sandy Silt	**Topsoil**	
2			1.0' - 8.0' Brown to Red Brown Silty Clay, trace Gravel		2
4			increasing Gravel and Cobble		4
6					6
8				**Stratum I**	8
10			**-End of Test Pit @ 8.0 Feet-**		10
12					12
14					14

Initial Water Level
Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-6**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **2/18/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 40º**

Test Pit Elevation **±208.5 FT**

Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.83'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.83' - 2.0'	Brown Silty Sand with Gravel		
2					**Stratum I**	2
			2.0' - 4.0'	Red Brown Sandy Gravel and Cobble, Highly Weathered Shale Bedrock (HWSB)		
4					**Stratum II**	4
			-Bucket Refusal @ 4.0 Feet-			
			-End of Test Pit @ 4.0 Feet-			
6						6
8						8
10						10
12						12
14						14

▼ Initial Water Level
▽ Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-7**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **6/2/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 60º**

Test Pit Elevation **±215.25 FT**
Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.83'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.83' - 2.0'	Brown to Red Brown Silty Sand with Gravel		
2					**Fill**	2
			2.0' - 6.0'	Brown Sandy Silt with Gravel		
4				soil mottling @ 4.0 feet		4
6					**Stratum I**	6
			6.0' - 8.0'	Red Brown Sandy Gravel and Cobbles, Highly Weathered Shale Bedrock (HWSB)		
8					**Stratum II**	8
			-Bucket Refusal @ 207.25 Feet-			
			-End of Test Pit @ 207.25 Feet-			
10						10
12						12
14						14

Initial Water Level
Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-8**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **6/2/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 60º**

Test Pit Elevation **±215.55 FT**
Groundwater
Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.83'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.83' - 3.0'	Brown to Red Brown Clayey Sand and Gravel		
2						2
					Fill	
			3.0' - 8.0'	Red Brown to Brown Clay with Sand and Gravel		
4						4
				very soft moist soil		
6				soil mottling @ 6.0 feet		6
8					**Stratum I**	8
			-Bucket Refusal @ 207.55 Feet-			
			-End of Test Pit @ 207.55 Feet-			
10						10
12						12
14						14

Initial Water Level
Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**
Project No.: **2402.001**
Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-9**
Page: **1** of **1**

Excavation Company: **Cat Iron**
Excavation Equipment: **Kubota KX57**
Operator: **Mike**

Date of Test Pit: **6/2/2026**
Field Representative: **M. Wright**
Drawn/Compiled By: **M. Wright**
Approved By: **D. Buckwalter**
Weather/Temperature **Sunny 60º**

Test Pit Elevation **±214.75 FT**
Groundwater Yes [ ] No [X]
Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.83'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.83' - 3.5'	Brown to Red Brown Silty Sand with Gravel		
2						2
					Stratum I	
4			3.5' - 5.5'	Red Brown Sandy Gravel and Cobbles, Highly Weathered Shale Bedrock (HWSB)		4
					Stratum II	
6			**-Bucket Refusal @ 209.25 Feet-**			6
			-End of Test Pit @ 209.25 Feet-			
8						8
10						10
12						12
14						14

▼ Initial Water Level
▽ Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**

Project No.: **2402.001**

Client: **Pottsgrove School District**

TEST PIT LOG

Test Pit No.: **TP-10**

Page: **1** of **1**

Excavation Company: **Cat Iron**

Excavation Equipment: **Kubota KX57**

Operator: **Mike**

Date of Test Pit: **6/2/2026**

Field Representative: **M. Wright**

Drawn/Compiled By: **M. Wright**

Approved By: **D. Buckwalter**

Weather/Temperature **Sunny 60º**

Test Pit Elevation **±214.90 FT**

Groundwater

Yes [ ] No [X]

Elevation: **Not Enc.**

Depth (Ft.)	Lithology	Water Level (ft.)	Soil / Rock Visual Descriptions		Remarks	Depth (Ft.)
			0.0'- 0.83'	Brown to Dark Brown Sandy Silt	**Topsoil**	
			0.83' - 5.5'	Red Brown Silt with Sand, trace Gravel		
2						2
4						4
					Stratum I	
6			5.5' - 7.5'	Red Brown Sandy Gravel and Cobbles, Highly Weathered Shale Bedrock (HWSB)		6
					Stratum II	
8			**-Bucket Refusal @ 207.4 Feet-**			8
			-End of Test Pit @ 207.4 Feet-			
10						10
12						12
14						14

Initial Water Level

Final Water Level

Notes:

K&W GEOTECH

Project: **Pottsgrove SD - Stadium Improvements**

Project No.: **2402.001**

Client: **Pottsgrove School District**

Date of Testing: **2/17/2026, 2/18/2026, 6/2/2026**

Temperature: **37-45°F, 50-75°F**

INFILTRATION TESTING LOG

Compiled By: **Michael Wright**

Date Compiled: **2/19/2026 & 6/3/2026**

Test Hole Number	Surface Elevation (feet)	Infiltration Test Elev (feet)	Drop in Water within Inner Ring during Presoak Period (inches)		Readings/Measurements - Drop in Water within Inner Ring at Time (inches)						Time Increment (Minutes) 10/30	* Infiltration Rate Inches/hour
			30 minutes	60 minutes	1	2	3	4	5	6		
IT-1A	212.0	N/A	**Infiltratiom Testing not Completed due to Bedrock**									
IT-1B	212.0	N/A	**Infiltratiom Testing not Completed due to Bedrock**									
IT-2A	207.0	N/A	**Infiltratiom Testing not Completed due to Perched Water & Bedrock**									
IT-2B	207.0	N/A	**Infiltratiom Testing not Completed due to Perched Water & Bedrock**									
IT-3A	216.0	214.0	1.25	0.625	0.325	0.325	0.325	0.25			30	0.50
IT-3B	216.0	212.0	0.125	0.0	0.0	0.0	0.0	0.0			30	0.00
IT-4A	215.0	213.0	0.0	0.0	0.0	0.0	0.0	0.0			30	0.00
IT-4B	215.0	211.0	0.0	0.0	0.0	0.0	0.0	0.0			30	0.00
IT-5A	213.5	209.5	0.25	0.25	0.25	0.25	0.25	0.125			30	0.25
IT-5B	213.5	207.5	0.0	0.0	0.0	0.0	0.0	0.0			30	0.00
IT-6A	208.5	206.5	0.25	0.125	0.125	0.125	0.125	0.125			30	0.09**
IT-6B	208.5	N/A	**Infiltration Testing not Completed due to Bedrock**									
IT-7A	215.25	213.75	0.375	0.125	0.00	0.00	0.00	0.00			30	0.00
IT-7B	215.25	N/A	**Infiltration Testing not Completed due to Soil Mottling**									
IT-8A	215.55	211.55	0.50	0.50	0.50	0.50	0.50	0.50			30	1.00
IT-8B	215.55	N/A	**Infiltration Testing not Completed due to Soil Mottling**									
IT-9A	214.75	211.25	0.00	0.00	0.00	0.00	0.00	0.00			30	0.00
IT-9B	214.75	213.25	3.50	2.75	0.50	0.375	0.375	0.375			10	0.72**
IT-10A	214.90	209.40	0.00	0.00	0.00	0.00	0.00	0.00			30	0.00
IT-10B	214.90	211.40	0.00	0.00	0.00	0.00	0.00	0.00			30	0.00

* Stabilized infiltration rates do not include a factor of safety for the design infiltration rate

** Percolation test completed in these tests due to subsurface soil conditions; double ring infiltrometers could not be sealed properly

SECTION 00 41 16 – BID FORM - WORK SCOPE NO.1 - GENERAL CONSTRUCTION

BID TO: Pottsgrove School District
1301 Kauffman Road, Pottstown, PA 19464

BID FROM: _____

_____

_____

THIS BID FORM SHALL NOT BE ALTERED IN ANY MANNER. ANY ALTERED BID FORMS SHALL BE CONSIDERED NON-RESPONSIVE AND WILL BE REJECTED.

1. The undersigned Bidder proposed and agrees, if written notice of the acceptance of this Bid is received by the undersigned within 60 days after date set for opening of this Bid, or at any other time thereafter before Bid is withdrawn, the undersigned agrees to enter into and execute a Contract with the Owner in accordance with this Bid as accepted. This shall be in a form acceptable to Owner, and the successful Bidder shall furnish and deliver to Owner the Performance Bond and Labor and Material Payment Bond in the forms provided in the Bidding Documents, and proof of insurance coverage, all within ten (10) days after notice of acceptance of this Bid.
2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation, those dealing with disposition of Bid Security. This Bid will remain open for 60 days after the day of Bid Opening unless the OWNER is delayed in awarding the Contract due to the failure to receive a required approval/permit from one or more reviewing bodies/governmental agencies having jurisdiction over the Project, the sale of bonds or the award of a Grant, in which case, Bids shall be irrevocable for 120 days. BIDDER will sign the Agreement and submit the required bonds and other documents required by the Contract Documents within ten (10) days after the date of OWNER'S Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
    a. Bidder has certified that it has examined copies of all Contract Documents. Bidder has made a thorough inspection of the premises and that the equipment and the construction activities that form the basis of this agreement can be completed in a good and workman-like manner for the amount of its Bid. Further, Bidder certifies that all of the equipment, installation, and construction activities to be supplied pursuant to this Bid and an agreement with Owner, if awarded. Bidder has reported any discrepancies, duplications, errors, or omissions in the Contract Documents, as required in the Contract Documents and hereby waives any claims for additional cost or time for such matters that were apparent or discoverable by Bidder from a thorough and complete review of the Contract Documents prior to submission of this Bid. Additionally, the Bidder hereby acknowledges receipt of the following addenda:

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

b. The Undersigned here certifies that this Bid is genuine and not a sham, collusive or fraudulent or made in the interest of or in behalf of any person, firm or corporation not herein named; and that the Undersigned has not, directly or indirectly, inducted or solicited any bidder to submit a sham bid, or any other person, firm or corporation from bidding, and that the Undersigned has not, in any manner, sought by collusion to secure for himself any advantage over any other Bidder.

c. In accordance with the Advertisement for Bids and the proposed Construction Documents distributed by CMTA, Inc. 1400 N. Providence Rd, Building 2, Suite 4045, Media, PA 19063, dated October 21, 2026, relating to Work Scope No. 1, General Construction, for Work generally described as the Pottsgrove High School Facility and Athletic Improvement Project, the undersigned, having visited the site of proposed construction and having become thoroughly familiar with local conditions affecting the cost and performance of the work and with all requirements of the Contract Documents and related Addenda, hereby proposes and agrees to provide all labor, materials and equipment required to construct and complete the Work in accordance with the Contract Documents and Addenda for the following amounts:

4. Base Bid:

Work Scope #1 Base Bid Price (INCLUDING Project Allowances) for all Work indicated on the Contract Documents for Work Scope No. 1, General Construction:

_____ Dollars.
(Written Amount)

($_____)
(Numerical Amount)

5. Alternates:
Reference Section 01 23 00, Alternates, for the full description of included Project Alternates for this Work Scope. Do not adjust material allowances under any alternate bid items. Indicate whether alternate cost is an add or deduct when a choice is provided.

Alternate No. 1 Unclassified Rock Excavation**,** as described in Specification Section 01 23 00 Alternates.

(Add, Deduct, No Change) $_____.
(Circle One) *(Numerical Amount)*

_____ Dollars.
(Written Amount)

Alternate No. 2 Roofing Material**,** as described in Specification Section 01 23 00 Alternates.

(Add, Deduct, No Change) $_____.
(Circle One) *(Numerical Amount)*

_____Dollars.
(Written Amount)

Alternate No. 3 Replace Brick with Ground Face Block**,** as described in Specification Section 01 23 00 Alternates.

(Add, Deduct, No Change) $_____.
(Circle One) *(Numerical Amount)*

_____Dollars.
(Written Amount)

Alternate No. 4 Eliminate Work on the Pole Barn**,** as described in Specification Section 01 23 00 Alternates.

(Add, Deduct, No Change) $_____.
(Circle One) *(Numerical Amount)*

_____Dollars.
(Written Amount)

Alternate No. 5 Eliminate Work on the Visitor's Side Concession Building**,** as described in Specification Section 01 23 00 Alternates.

(Add, Deduct, No Change) $_____.
(Circle One) *(Numerical Amount)*

_____Dollars.
(Written Amount)

Alternate No. 6 Eliminate Work on the Trainer's Room Building as described in Specification Section 01 23 00 Alternates.

(Add, Deduct, No Change) $_____.
(Circle One) *(Numerical Amount)*

_____Dollars.
(Written Amount)

6. Unit Prices:

The Bidder is required to bid unit prices on the following items as identified in Section 01 22 00 – Unit Prices and Material Allowances in accordance with the Contract Documents. Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidental costs necessary to complete the specified operation. Unit Prices will be used to ADD/DEDUCT to the Contract cost where appropriate. The BIDDER agrees that in

the event of any inconsistency between a Unit Price and the extension of a Unit Price in a Material Allowance, the Unit Price shall control and the Material Allowance extension shall be recalculated.

If any extra work is required in these categories beyond the contract requirements, the unit prices shall be used as a basis for determining the amount of additional payment to the Contractor. The Bidder agrees that Owner reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owner's opinion, the nature or quantity of the Work encountered is such that the Unit Price cost no longer applies to the Work. The Owner also reserves the right to solicit independent proposals as required by the Department of Education guidelines, under a separate contract, to perform the services required. **The responsiveness of the Bid may be determined by the Owner on the basis of the Unit Prices proposed by the BIDDER. Unit Prices shall be consistent with verifiable average costs for the Work to be performed. Bidders agree that a Bid may be rejected if the Unit Prices submitted are inconsistent with the average cost. Under NO circumstances will BIDDER perform Unit Price Work without prior written authorization from OWNER.** The Construction Manager must field measure and approve all allowance work prior to the Contractor performing the Work. Should the allowance amount be exceeded, the Contractor will be paid by Change Order addition at the Unit Price established for the related Work. Similarly, should the allowance used be less than the allowance amount, the Contractor will credit the Owner for the unused quantity in accordance with the related Unit Price by a Change Order deduction.

The contract Unit Price per (UOM) for Unit Price WS-1A as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1B as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1C as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1D as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1E as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1F as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1G as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1H as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1I as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-1J as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

(REMAINDER OF PAGE INTENTIONALLY LEFT BLANK)

In witness whereof, the undersigned has caused this Proposal to be executed this _____day of _____ 20_____.

Name of Contractor: _____

State of Incorporation for Contractor: _____

Contractor (Entity) Type: _____

Street Address: _____

City: _____State: _____Zip: _____

Phone Number: _____Fax Number: _____

Name of Representative: _____

Title of Representative: _____

Signature of Representative: _____

Date of Signature: _____

Name of Witness: _____

Signature of Witness: _____

Date of Signature: _____

END OF SECTION 00 41 16

SECTION 00 41 17 – BID FORM - WORK SCOPE NO. 2 - ELECTRICAL CONSTRUCTION

BID TO: Pottsgrove School District
1301 Kauffman Road, Pottstown, PA 19464

BID FROM: _____

_____

_____

THIS BID FORM SHALL NOT BE ALTERED IN ANY MANNER. ANY ALTERED BID FORMS SHALL BE CONSIDERED NON-RESPONSIVE AND WILL BE REJECTED.

1. The undersigned Bidder proposed and agrees, If written notice of the acceptance of this Bid is received by the undersigned within 60 days after date set for opening of this Bid, or at any other time thereafter before Bid is withdrawn, the undersigned agrees to enter into and execute a Contract with the Owner in accordance with this Bid as accepted. This shall be in a form acceptable to Owner, and the successful Bidder shall furnish and deliver to Owner the Performance Bond and Labor and Material Payment Bond, in the forms provided in the Bidding Documents, and proof of insurance coverage, all within ten (10) days after notice of acceptance of this Bid.
2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation, those dealing with disposition of Bid Security. This Bid will remain open for 60 days after the day of Bid Opening unless the OWNER is delayed in awarding the Contract due to the failure to receive a required approval/permit from one or more reviewing bodies/governmental agencies having jurisdiction over the Project, the sale of bonds or the award of a Grant, in which case, Bids shall be irrevocable for 120 days. BIDDER will sign the Agreement and submit the required bonds and other documents required by the Contract Documents within ten (10) days after the date of OWNER'S Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
    a. Bidder has certified that it has examined copies of all Contract Documents. Bidder has made a thorough inspection of the premises and that the equipment and the construction activities that form the basis of this agreement can be completed in a good and workman-like manner for the amount of its Bid. Further, Bidder certifies that all of the equipment, installation, and construction activities to be supplied pursuant to this Bid and an agreement with Owner, if awarded. Bidder has reported any discrepancies, duplications, errors, or omissions in the Contract Documents, as required in the Contract Documents and hereby waives any claims for additional cost or time for such matters that were apparent or discoverable by Bidder from a thorough and complete review of the Contract Documents prior to submission of this Bid. Additionally, the Bidder hereby acknowledges receipt of the following addenda:

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

b. The Undersigned here certifies that this Bid is genuine and not a sham, collusive or fraudulent or made in the interest of or in behalf of any person, firm or corporation not herein named; and that the Undersigned has not, directly or indirectly, inducted or solicited any bidder to submit a sham bid, or any other person, firm or corporation from bidding, and that the Undersigned has not, in any manner, sought by collusion to secure for himself any advantage over any other Bidder.

c. In accordance with the Advertisement for Bids and the proposed Construction Documents distributed by CMTA, Inc. 1400 N. Providence Rd, Building 2, Suite 4045, Media, PA 19063, dated October 21, 2026 relating to Work Scope No. 2, Electrical Construction, for Work generally described as the Pottsgrove High School Facility and Athletic Improvement Project, the undersigned, having visited the site of proposed construction and having become thoroughly familiar with local conditions affecting the cost and performance of the work and with all requirements of the Contract Documents and related Addenda, hereby proposes and agrees to provide all labor, materials and equipment required to construct and complete the Work in accordance with the Contract Documents and Addenda for the following amounts:

4. Base Bid:

Work Scope #2 Base Bid Price (INCLUDING Project Allowances) for all Work indicated on the Contract Documents for Work Scope No. 2, Electrical Construction:

_____ Dollars.
(Written Amount)

($_____)
(Numerical Amount)

5. Alternates:
   Reference Section 01 23 00, Alternates, for the full description of included Project Alternates for this Work Scope. Do not adjust material allowances under any alternate bid items. Indicate whether alternate cost is an add or deduct when a choice is provided.

   Alternate No. 1 Unclassified Rock Excavation**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

   Alternate No. 2 Eliminate Work on the Visitor's Side Concession Building**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

   Alternate No. 3 Eliminate work on the Trainer's Room Building**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

6. Unit Prices:
   The Bidder is required to bid unit prices on the following items as identified in Section 01 22 00 – Unit Prices and Material Allowances in accordance with the Contract Documents. Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidental costs necessary to complete the specified operation. Unit Prices will be used to ADD/DEDUCT to the Contract cost where appropriate. The BIDDER agrees that in the event of any inconsistency between a Unit Price and the extension of a Unit Price in a Material Allowance, the Unit Price shall control and the Material Allowance extension shall be recalculated.

   If any extra work is required in these categories beyond the contract requirements, the unit prices shall be used as a basis for determining the amount of additional payment to the Contractor. The Bidder agrees that Owner reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owner's opinion, the nature or quantity of the Work encountered is such that the Unit Price cost no longer applies to the Work. The Owner also reserves the right to solicit independent proposals as required by the Department of Education guidelines, under a separate contract, to perform the services required. **The responsiveness of the Bid may be determined by the Owner on the basis of the Unit Prices proposed by the BIDDER. Unit Prices shall be consistent with verifiable average costs for the**

Work to be performed. Bidders agree that a Bid may be rejected if the Unit Prices submitted are inconsistent with the average cost. Under NO circumstances will BIDDER perform Unit Price Work without prior written authorization from OWNER. The Construction Manager must field measure and approve all allowance work prior to the Contractor performing the Work. Should the allowance amount be exceeded, the Contractor will be paid by Change Order addition at the Unit Price established for the related Work. Similarly, should the allowance used be less than the allowance amount, the Contractor will credit the Owner for the unused quantity in accordance with the related Unit Price by a Change Order deduction.

The contract Unit Price per (UOM) for Unit Price WS-2A as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2B as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2C as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2D as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2E as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2F as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2G as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2H as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2I as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2J as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2K as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-2L as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

(REMAINDER OF PAGE INTENTIONALLY LEFT BLANK)

In witness whereof, the undersigned has caused this Proposal to be executed this _____day of _____ 20_____.

Name of Contractor: _____

State of Incorporation for Contractor: _____

Contractor (Entity) Type: _____

Street Address: _____

City: _____State: _____Zip: _____

Phone Number: _____Fax Number: _____

Name of Representative: _____

Title of Representative: _____

Signature of Representative: _____

Date of Signature: _____

Name of Witness: _____

Signature of Witness: _____

Date of Signature: _____

END OF SECTION 00 41 17

SECTION 00 41 18 – BID FORM - WORK SCOPE NO. 3 - MECHANICAL CONSTRUCTION

BID TO: Pottsgrove School District
1301 Kauffman Road, Pottstown, PA 19464

BID FROM: _____

_____

_____

THIS BID FORM SHALL NOT BE ALTERED IN ANY MANNER. ANY ALTERED BID FORMS SHALL BE CONSIDERED NON-RESPONSIVE AND WILL BE REJECTED.

1. The undersigned Bidder proposed and agrees, if written notice of the acceptance of this Bid is received by the undersigned within 60 days after date set for opening of this Bid, or at any other time thereafter before Bid is withdrawn, the undersigned agrees to enter into and execute a Contract with the Owner in accordance with this Bid as accepted. This shall be in a form acceptable to Owner, and the successful Bidder shall furnish and deliver to Owner the Performance Bond and Labor and Material Payment Bond in the forms provided in the Bidding Documents, and proof of insurance coverage, all within ten (10) days after notice of acceptance of this Bid.

2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation, those dealing with disposition of Bid Security. This Bid will remain open for 60 days after the day of Bid Opening unless the OWNER is delayed in awarding the Contract due to the failure to receive a required approval/permit from one or more reviewing bodies/governmental agencies having jurisdiction over the Project, the sale of bonds or the award of a Grant, in which case, Bids shall be irrevocable for 120 days. BIDDER will sign the Agreement and submit the required bonds and other documents required by the Contract Documents within ten (10) days after the date of OWNER'S Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

    a. Bidder has certified that it has examined copies of all Contract Documents. Bidder has made a thorough inspection of the premises and that the equipment and the construction activities that form the basis of this agreement can be completed in a good and workman-like manner for the amount of its Bid. Further, Bidder certifies that all of the equipment, installation, and construction activities to be supplied pursuant to this Bid and an agreement with Owner, if awarded. Bidder has reported any discrepancies, duplications, errors, or omissions in the Contract Documents, as required in the Contract Documents and hereby waives any claims for additional cost or time for such matters that were apparent or discoverable by Bidder from a thorough and complete review of the Contract Documents prior to submission of this Bid. Additionally, the Bidder hereby acknowledges receipt of the following addenda:

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

b. The Undersigned here certifies that this Bid is genuine and not a sham, collusive or fraudulent or made in the interest of or in behalf of any person, firm or corporation not herein named; and that the Undersigned has not, directly or indirectly, inducted or solicited any bidder to submit a sham bid, or any other person, firm or corporation from bidding, and that the Undersigned has not, in any manner, sought by collusion to secure for himself any advantage over any other Bidder.

c. In accordance with the Advertisement for Bids and the proposed Construction Documents distributed by CMTA, Inc., 1400 N. Providence Rd, Building 2, Suite 4045, Media, PA 19063, dated October 21, 2026, relating to Work Scope No. 3, Mechanical Construction, for Work generally described as the Pottsgrove High School Facility and Athletic Improvement Project, the undersigned, having visited the site of proposed construction and having become thoroughly familiar with local conditions affecting the cost and performance of the work and with all requirements of the Contract Documents and related Addenda, hereby proposes and agrees to provide all labor, materials and equipment required to construct and complete the Work in accordance with the Contract Documents and Addenda for the following amounts:

4. Base Bid:

Work Scope #3 Base Bid Price (INCLUDING Project Allowances) for all Work indicated on the Contract Documents for Work Scope No. 3, Mechanical Construction:

_____ Dollars.
(Written Amount)

($_____)
(Numerical Amount)

5. Alternates:
   Reference Section 01 23 00, Alternates, for the full description of included Project Alternates for this Work Scope. Do not adjust material allowances under any alternate bid items. Indicate whether alternate cost is an add or deduct when a choice is provided.

   Alternate No. 1 Eliminate work on the Visitor's Side Concession Building**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

   Alternate No. 2 Eliminate work on the Trainer's Room Building**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

6. Unit Prices:
   The Bidder is required to bid unit prices on the following items as identified in Section 01 22 00 – Unit Prices and Material Allowances in accordance with the Contract Documents. Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidental costs necessary to complete the specified operation. Unit Prices will be used to ADD/DEDUCT to the Contract cost where appropriate. The BIDDER agrees that in the event of any inconsistency between a Unit Price and the extension of a Unit Price in a Material Allowance, the Unit Price shall control and the Material Allowance extension shall be recalculated.

   If any extra work is required in these categories beyond the contract requirements, the unit prices shall be used as a basis for determining the amount of additional payment to the Contractor. The Bidder agrees that Owner reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owner's opinion, the nature or quantity of the Work encountered is such that the Unit Price cost no longer applies to the Work. The Owner also reserves the right to solicit independent proposals as required by the Department of Education guidelines, under a separate contract, to perform the services required. **The responsiveness of the Bid may be determined by the Owner on the basis of the Unit Prices proposed by the BIDDER. Unit Prices shall be consistent with verifiable average costs for the Work to be performed. Bidders agree that a Bid may be rejected if the Unit Prices submitted are inconsistent with the average cost. Under NO circumstances will BIDDER perform Unit Price Work without prior written authorization from OWNER.** The Construction Manager must field measure and approve all allowance work prior to the Contractor performing the Work. Should the allowance amount be exceeded, the Contractor will be paid by Change Order addition at the Unit Price established for the related Work. Similarly, should the allowance used be less than the allowance amount, the Contractor will credit the Owner for the unused quantity in accordance with the related Unit Price by a Change Order deduction.

The contract Unit Price per (UOM) for Unit Price WS-3A as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-3B as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-3C as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-3D as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

(REMAINDER OF PAGE INTENTIONALLY LEFT BLANK)

In witness whereof, the undersigned has caused this Proposal to be executed this _____day of _____ 20_____.

Name of Contractor: _____

State of Incorporation for Contractor: _____

Contractor (Entity) Type: _____

Street Address: _____

City: _____State: _____Zip: _____

Phone Number: _____Fax Number: _____

Name of Representative: _____

Title of Representative: _____

Signature of Representative: _____

Date of Signature: _____

Name of Witness: _____

Signature of Witness: _____

Date of Signature: _____

END OF SECTION 00 41 18

SECTION 00 41 19 – BID FORM - WORK SCOPE NO. 4 - PLUMBING CONSTRUCTION

BID TO: Pottsgrove School District
1301 Kauffman Road, Pottsville, PA 19464

BID FROM: _____

_____

_____

THIS BID FORM SHALL NOT BE ALTERED IN ANY MANNER. ANY ALTERED BID FORMS SHALL BE CONSIDERED NON-RESPONSIVE AND WILL BE REJECTED.

1. The undersigned Bidder proposed and agrees, if written notice of the acceptance of this Bid is received by the undersigned within 60 days after date set for opening of this Bid, or at any other time thereafter before Bid is withdrawn, the undersigned agrees to enter into and execute a Contract with the Owner in accordance with this Bid as accepted. This shall be in a form acceptable to Owner, and the successful Bidder shall furnish and deliver to Owner the Performance Bond and Labor and Material Payment Bond in the forms provided in the Bidding Documents, and proof of insurance coverage, all within ten (10) days after notice of acceptance of this Bid.

2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation, those dealing with disposition of Bid Security. This Bid will remain open for 60 days after the day of Bid Opening unless the OWNER is delayed in awarding the Contract due to the failure to receive a required approval/permit from one or more reviewing bodies/governmental agencies having jurisdiction over the Project, the sale of bonds or the award of a Grant, in which case, Bids shall be irrevocable for 120 days. BIDDER will sign the Agreement and submit the required bonds and other documents required by the Contract Documents within ten (10) days after the date of OWNER'S Notice of Award.

3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
    a. Bidder has certified that it has examined copies of all Contract Documents. Bidder has made a thorough inspection of the premises and that the equipment and the construction activities that form the basis of this agreement can be completed in a good and workman-like manner for the amount of its Bid. Further, Bidder certifies that all of the equipment, installation, and construction activities to be supplied pursuant to this Bid and an agreement with Owner, if awarded. Bidder has reported any discrepancies, duplications, errors, or omissions in the Contract Documents, as required in the Contract Documents and hereby waives any claims for additional cost or time for such matters that were apparent or discoverable by Bidder from a thorough and complete review of the Contract Documents prior to submission of this Bid. Additionally, the Bidder hereby acknowledges receipt of the following addenda:

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

Addenda No. _____ Dated _____

b. The Undersigned here certifies that this Bid is genuine and not a sham, collusive or fraudulent or made in the interest of or in behalf of any person, firm or corporation not herein named; and that the Undersigned has not, directly or indirectly, inducted or solicited any bidder to submit a sham bid, or any other person, firm or corporation from bidding, and that the Undersigned has not, in any manner, sought by collusion to secure for himself any advantage over any other Bidder.

c. In accordance with the Advertisement for Bids and the proposed Construction Documents distributed by CMTA Inc., 1400 N. Providence Rd, Building 2, Suite 4045, Media, PA 19063, dated October 21, 2026, relating to Work Scope No. 4, Plumbing Construction, for Work generally described as the Pottsgrove High School Facility and Athletic Improvement Project, the undersigned, having visited the site of proposed construction and having become thoroughly familiar with local conditions affecting the cost and performance of the work and with all requirements of the Contract Documents and related Addenda, hereby proposes and agrees to provide all labor, materials and equipment required to construct and complete the Work in accordance with the Contract Documents and Addenda for the following amounts:

4. Base Bid:

Work Scope #4 Base Bid Price (INCLUDING Project Allowances) for all Work indicated on the Contract Documents for Work Scope No. 4, Plumbing Construction:

_____ Dollars.
(Written Amount)

($_____)
(Numerical Amount)

5. Alternates:
   Reference Section 01 23 00, Alternates, for the full description of included Project Alternates for this Work Scope. Do not adjust material allowances under any alternate bid items. Indicate whether alternate cost is an add or deduct when a choice is provided.

   Alternate No. 1 Unclassified Rock Excavation**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

   Alternate No. 2 Eliminate work on the Visitor's Side Concession Building**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

   Alternate No. 3 Eliminate work on the Trainer's Room Building**,** as described in Specification Section 01 23 00 Alternates.

   (Add, Deduct, No Change) $_____.
   (Circle One) *(Numerical Amount)*

   _____Dollars.
   (Written Amount)

6. Unit Prices:
   The Bidder is required to bid unit prices on the following items as identified in Section 01 22 00 – Unit Prices and Material Allowances in accordance with the Contract Documents. Unit Prices shall include costs for furnishing and installing all materials, labor, tools, equipment, and other incidental costs necessary to complete the specified operation. Unit Prices will be used to ADD/DEDUCT to the Contract cost where appropriate. The BIDDER agrees that in the event of any inconsistency between a Unit Price and the extension of a Unit Price in a Material Allowance, the Unit Price shall control and the Material Allowance extension shall be recalculated.

   If any extra work is required in these categories beyond the contract requirements, the unit prices shall be used as a basis for determining the amount of additional payment to the Contractor. The Bidder agrees that Owner reserves the right to reject or otherwise not agree to use the Unit Prices submitted, if in the Owner's opinion, the nature or quantity of the Work encountered is such that the Unit Price cost no longer applies to the Work. The Owner also reserves the right to solicit independent proposals as required by the Department of Education guidelines, under a separate contract, to perform the services required. **The responsiveness of the Bid may be determined by the Owner on the basis of the Unit Prices proposed by the BIDDER. Unit Prices shall be consistent with verifiable average costs for the**

Work to be performed. Bidders agree that a Bid may be rejected if the Unit Prices submitted are inconsistent with the average cost. Under NO circumstances will BIDDER perform Unit Price Work without prior written authorization from OWNER. The Construction Manager must field measure and approve all allowance work prior to the Contractor performing the Work. Should the allowance amount be exceeded, the Contractor will be paid by Change Order addition at the Unit Price established for the related Work. Similarly, should the allowance used be less than the allowance amount, the Contractor will credit the Owner for the unused quantity in accordance with the related Unit Price by a Change Order deduction.

The contract Unit Price per (UOM) for Unit Price WS-4A as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-4B as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-4C as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-4D as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-4E as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-4F as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

The contract Unit Price per (UOM) for Unit Price WS-4G as described in Section 01 22 00, Unit Prices and Material Allowances is:

$ _____per (UOM) x Cost extension of quantity indicated in Section 01 22 00:

$_____ (total cost allowance for Unit Price).

(REMAINDER OF PAGE INTENTIONALLY LEFT BLANK)

In witness whereof, the undersigned has caused this Proposal to be executed this _____day of _____ 20_____.

Name of Contractor: _____

State of Incorporation for Contractor: _____

Contractor (Entity) Type: _____

Street Address: _____

City: _____State: _____Zip: _____

Phone Number: _____Fax Number: _____

Name of Representative: _____

Title of Representative: _____

Signature of Representative: _____

Date of Signature: _____

Name of Witness: _____

Signature of Witness: _____

Date of Signature: _____

END OF SECTION 00 41 19

SECTION 00 43 13 - BID SECURITY FORM

The Bid Security Form utilized for this project shall be a “Bid Bond”, AIA Document A310-2010, included herein in the Project Manual. Reference Section 00 21 13, “Instructions to Bidders” for the execution of the Bid Bond.

END OF SECTION 00 43 13

AIA® Document A310™ – 2010

Bid Bond

CONTRACTOR:
(Name, legal status and address)

SURETY:
(Name, legal status and principal place of business)

OWNER:
(Name, legal status and address)
Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

BOND AMOUNT: 10 % of the total Bid Amount

PROJECT:
(Name, location or address, and Project number, if any)
Pottsgrove High School Facilities & Athletic Improvement Project
1301 Kauffman Road
Pottstown, PA 19464

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

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This Bond shall be governed by the laws of the Commonwealth of Pennsylvania. The Principal and Surety hereby consent to the personal jurisdiction and venue of the Court of Common Pleas of Montgomery County, Pennsylvania, and each of them agree that all litigation, claims and disputes arising under or pertaining to this bond shall be decided by the Court of Common Pleas of Montgomery County, Pennsylvania. The Principal and the Surety further agree that such court shall have exclusive venue and jurisdiction over the parties to this Agreement, and also the Principal and Surety agree to consent to service of process by any means authorized by Pennsylvania law.

Signed and sealed this day of ,

	(Contractor as Principal) *(Seal)*
(Witness)	*(Title)*
	(Surety) *(Seal)*
(Witness)	*(Title)*

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SECTION 00 43 15 – AGREEMENT OF SURETY

KNOW ALL MEN BY THESE PRESENTS, that we, _____, as Surety, a corporation existing under the laws of the State of _____, and authorized to transact business in the Commonwealth of Pennsylvania hereby agrees intending to be legally bound hereby, to execute and deliver to the Pottsgrove School District, within the time limit specified in the Contract Documents, the Performance Bond and Payment Bond in the forms included in the Contract Documents each in an amount of 100% of the Contract Sum, in favor of the Pottsgrove School District, as required for the faithful performance and proper fulfillment of the Contract for Work Scope No. _____ for the Pottsgrove High School Facility and Athletic Improvement Project, Lower Pottsgrove Township, Montgomery County, Pennsylvania, on behalf of _____ (hereinafter called the Bidder) provided that the above contract be awarded to the Bidder within sixty (60) days after the date of opening of the bids or otherwise as set forth in the Instructions to Bidders.

Surety further agrees that should the Surety, after notification of intent to make such award, omit or refuse to execute the required bonds and agreement, then the Surety shall pay to the Pottsgrove School District hereinafter called the Obligee, any difference between the total amount specified in said Bidder's proposal for the required work and the amount of which said Obligee may procure the same work, if the latter amount be in excess of the former, plus any advertising, architectural, legal, and other expenses incurred by Obligee; provided, however, that the obligations of Surety hereunder shall not exceed the amount of bid security provided by the Bidder together with interest.

Dated: _____, 20_____

_____(CORPORATE SURETY)

WITNESS OR ATTEST:

_____ By: _____
Attorney-in-Fact*

NAME: _____
(Please type)

**Attach an appropriate Power of Attorney, dated as of the same date as this Agreement, evidencing the authority of the Attorney-in-Fact to act on behalf of the Corporation.*

END OF SECTION 00 43 15

Substitution Request

Incomplete forms will not be processed.

SUBSTITUTION REQUEST # _____

Check ONE:

Request during Bidding: ☐

After Bidding/Contract Award: ☐

PROJECT NAME: Pottsgrove High School Facility & Athletic Improvement

TO: Scott Kennedy, Phone: 267-718-0148

FROM: _____

DATE: _____

Specification

Section Title: _____

Section Number: _____

Paragraph: _____

Description: _____

Proposed Substitution (*Note: Limit this Request to one substitution)*

Manufacturer: _____ Address: _____

Trade Name: _____ Model Number: _____

Phone Number: _____ Contact Person: _____

Installer: _____ Address: _____

Phone Number: _____ Contact Person: _____

History: ☐ New Product ☐ 1 to 4 years old
☐ 5 to 10 years old ☐ More than 10 years old

Differences between proposed substitution and specified product:

_____

_____

_____

_____

Point by point comparison data attached – REQUIRED

Reason for Not Providing Specified Item:

_____

_____

_____

Similar Installation Project References: Include Date Installed Project: _____

Architect: _____ Address: _____

Owner: _____

_____

Proposed substitution affects other parts of Work: ☐ No ☐ Yes; Explain:

_____

_____

_____

Amount of Savings to Owner for this Substitution:$_____

Will Requested Substitution Impact Schedule:☐ No ☐ Yes, Add _____days.

Attached Supporting Data: ☐ Product Data ☐ Drawings ☐ Equipment Layout ☐ Design Drawing ☐ Calculations ☐ Warranty ☐ Tests ☐ Reports ☐ Samples

Contractor's Certification

The undersigned party, proposing this Substitution, certifies the following as true and correct and accepts all conditions relating to this request:

- This Substitution has been fully investigated and determined to be equal or superior in all respects.
- The same warranty will be furnished.
- The same maintenance service and source of replacement parts, as applicable, is available.
- The change to the Construction Progress Schedule is as stated above.
- The cost data as stated above is complete. All claims for any additional costs related to this Substitution, if accepted, are explicitly waived by the Contractor.
- The Substitution does not affect dimensions or functional clearances.
- All architectural/engineering design fees associated with the review, evaluation, and or design and detailing changes as a result of this Substitution Request are the responsibility of the Contractor. The amount of these fees will be deducted from the Contract Sum due to the Contractor.
- Coordination, installation, and changes to the Work as necessary for an accepted Substitution will be complete in all respects.

Submitted By: _____

Signature: _____

Firm: _____

Address: _____ Telephone: _____

Consultant's Review and Recommendation

☐ Substitution Recommended: Make submittals in accordance with Specifications.

☐ Substitution Recommended as Noted: Make submittals in accordance with Specifications.

☐ Substitution Rejection Recommended: Use specified products. Architect shall not be held responsible for the performance of any substitution accepted or approved by Owner over the recommendation of the Architect (Release and Indemnification Agreement between Owner and Architect required).

☐ Substitution Request returned: Incomplete submittal, use specified products.

Comments:

_____

_____

_____

Signature: _____ Date: _____

SECTION 00 43 93 - BID SUBMITTAL ATTACHMENTS

1.01 GENERAL

A. The below referenced forms with corresponding Specification Section number shall be submitted in conjunction with Bids. Substitute forms will not be acceptable. All forms shall be fully executed by an authorized person and notary seals applied where indicated.

1. Section 00 11 53, AIA A305 Request for Qualifications, and associated Exhibits A through D:

    a. Exhibit A: General Information
    b. Exhibit B: Financial and Performance Information
    c. Exhibit C: Project-Specific Information
    d. Exhibit D: Past Project Experience

2. Section(s) 00 41 16 through 00 41 19, Bid Form(s) for Work Scope being Bid.
3. Section 00 43 13, Bid Bond Form, if bid security provided is a Bid Bond.
4. Section 00 43 15, Agreement of Surety, if certified check is provided as Bid Security.
5. Section 00 45 19, Non-Collusion Affidavit.

END OF SECTION 00 43 93

SECTION 00 45 19 - NON-COLLUSION AFFIDAVIT

State of _____ :
SS
County of _____ :

I state that I am _____ of _____
(Title) (Name of Firm)
and that I am authorized to make this Affidavit on behalf of my firm, and its Owners, Directors and Officers. I am the person responsible in my firm for the price(s) and the amount of this Bid.

I state that:

1. The price(s) and amount of this Bid have been arrived at independently and without consultation, communication or agreement with any other contractor, bidder or potential bidder.

2. Neither the price(s) nor the amount of this Bid, and neither the approximate price(s) nor approximate amount of this Bid, have been disclosed to any other firm or person who is a bidder or potential bidder, and they will not be disclosed before Bid opening.

3. No attempt has been made or will be made to induce any firm or person to refrain from bidding on this contract, or to submit a bid higher than this Bid, or to submit any intentionally high or noncompetitive bid or other form of complementary bid.

4. The Bid of my firm is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any firm or person to submit a complementary or other noncompetitive bid.

5. _____, its affiliates,
(Name of My Firm)
subsidiaries, officers, directors and employees are not currently under investigation by any governmental agency and have not in the last three years been convicted or found liable for any act prohibited by State or Federal Law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract except as follows:

_____
_____
_____
_____
_____
_____
_____

_____
_____
_____
_____
_____
_____
_____

I state that _____ understands
(Name of My Firm)

and acknowledges that the above representations are material and important, and will be relied on by the POTTSGROVE SCHOOL DISTRICT in awarding the contract(s) for which this Bid is submitted. I understand and my firm understands that any misstatement in this Affidavit is and shall be treated as fraudulent concealment from the POTTSGROVE SCHOOL DISTRICT of the true facts relating to the submission of bids for this contract.

_____
(Name)

_____
(Company Position)

SWORN TO AND SUBSCRIBED

BEFORE ME THIS _____ DAY

OF _____, 20___.

_____ _____
Notary Public My Commission Expires

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

1. This Non-Collusion Affidavit is material to any contract awarded pursuant to this Bid. According to Section 4507 of the Pennsylvania Commonwealth Procurement Code, 62 Pa.C.S. § 4507, governmental agencies may require Non-Collusion Affidavits to be submitted together with bids.

2. This Non-Collusion Affidavit must be executed by the member, officer or employee of the bidder who makes the final decision on prices and the amount quoted in the bid.

3. Bid rigging and other efforts to restrain competition, and the making of false SWORN statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all of persons employed by or associated with the bidder with responsibilities for the preparation, approval or submission of the bid.

4. In case of a bid submitted by a joint venture, each party to the venture must be identified in the Bid Documents, and an Affidavit must be submitted separately on behalf of each party.

5. The term “Complementary Bid” as used in the Affidavit has the meaning commonly associated with that term in the bidding process and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any other form of bid submitted for the purpose of giving a false appearance of competition.

6. Failure to file an Affidavit in compliance with these instructions may result in disqualification of the bid.

7. A bidder’s statement that it has been convicted or found liable for any act prohibited by Federal or State Law in any jurisdiction involving conspiracy or collusion with respect to bidding on any public contract within the last three (3) years does not prohibit a government agency from accepting a bid from or awarding a contract to that bidder, but it may be grounds for administrative suspension or debarment in the discretion of the government agency under the rules and regulations of that agency or, in the case of a government agency with no administrative suspension or debarment regulations or procedures, may be grounds for consideration on the question of whether the agency should decline to award a contract to that person on the basis of lack of responsibility.

Note: This document must be completed, signed, notarized and returned with your bid.

END OF SECTION 00 45 19

SECTION 00 50 00 - LIST OF CONTRACT FORMS

1.01 GENERAL

A. The following is a list of forms and standards applicable to this Project.

1.02 FORMS

A. Bid Form: As bound in this Project Manual, Sections 00 41 16 through 00 41 19.
B. Bid Bond Form: As bound in this Project Manual as Section 00 43 13 that complies with all state requirements. Submit with Bid with proper Power of Attorney certificate and acknowledgment.
C. Contract Form: The Contract form will be AIA document A132-2019, as modified. See Agreement included as Section 00 52 13.
D. Performance/Payment Bond: Performance Bond and Payment Bond as provided in the Project Manual as Sections 00 61 14 and 00 61 15 that complies with all state requirements. Submit in two copies, with proper Power of Attorney and acknowledgement within 10 days of the Notice of Intent to Award.
E. Section 00 22 21, Act 141: Public Works Employment Verification Form.

END OF SECTION 00 50 00

SECTION 00 52 13 – STANDARD FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR - AIA A132

The attached copy of AIA Document A132, Standard Form of Agreement Between Owner and Contractor, as modified, is hereby made a part of the Contract Documents and Specifications. There is no implied permission to reproduce this document. The original document purchased by the user is intended to be consumed in the course of this project.

END OF SECTION 00 52 13

AIA® Document A132® – 2019

Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition

AGREEMENT made as of the day of in the year
(In words, indicate day, month, and year.)

BETWEEN the Owner:
(Name, legal status, address, and other information)

Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

and the Contractor:
(Name, legal status, address, and other information)

Work Scope 1 – General Construction
Work Scope 2 – Mechanical Construction
Work Scope 3 – Electrical Construction
Work Scope 4 – Plumbing Construction

for the following Project:
(Name, location, and detailed description)

Pottsgrove High School Facility & Athletic Improvement Project
Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

The Construction Manager:
(Name, legal status, address, and other information)

CMTA, Inc.
9519 Civic Way, Suite 100
Prospect, KY 40059

The Architect:
(Name, legal status, address, and other information)

Godshall Kane O'Rourke Architects, LLC (GKO Architects, LLC)
300 Brookside Avenue
Ambler Yards, Building 18, Suite 150
Ambler, PA 19002

The Owner and Contractor agree as follows.

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser. AIA Document A232™–2019 is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.
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TABLE OF ARTICLES

1 THE CONTRACT DOCUMENTS

2 THE WORK OF THIS CONTRACT

3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

4 CONTRACT SUM

5 PAYMENTS

6 DISPUTE RESOLUTION

7 TERMINATION OR SUSPENSION

8 MISCELLANEOUS PROVISIONS

9 ENUMERATION OF CONTRACT DOCUMENTS

ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General and other Conditions), Drawings, Specifications and Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than Modifications, appears in Article 9. For purposes of this Agreement, the term "General Conditions" as used herein shall mean the AIA A232-2019, General Conditions of the Contract for Construction, as modified.

ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents or reasonably inferable by the Contractor as necessary to produce the results intended by the Contract Documents except as specifically indicated in the Contract Documents to be the responsibility of others.

ARTICLE 3 DATE OF COMMENCEMENT AND DATES OF SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:
(Check one of the following boxes.)

[X] The date of this Agreement.

[ ] A fixed date set forth in the Notice to Proceed issued by the Owner or Construction Manager.

[ ] Established as follows:
(Insert a date or a means to determine the date of commencement of the Work.)

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

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§ 3.3 Substantial Completion of the Project or Portions Thereof

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the date of Substantial Completion of each milestone, each phase, and the entire Work of all of the Contractors for the Project will be:
(Insert the date of Substantial Completion of the Work of all Contractors for the Project.)

Not later than the dates listed in the Contract Documents.

§ 3.3.2 Intentionally deleted.

(Table deleted)

§ 3.4 When the Work of this Contract, or any Portion Thereof, is Substantially Complete

§ 3.4.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall substantially complete the entire Work of this Contract:
(Check one of the following boxes and complete the necessary information.)

[X] Not later than the dates listed in the Contract Documents.

[ ] By the following date:

§ 3.4.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work of this Contract are to be substantially complete prior to when the entire Work of this Contract shall be substantially complete, the Contractor shall substantially complete such portions by the following dates:

Portion of Work	Date to be substantially complete

§ 3.4.3 If the Contractor fails to substantially complete the Work of this Contract, or portions thereof, as provided in this Section 3.4, liquidated damages, shall be assessed as set forth in Section 9.11 of the General Conditions.

ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be one of the following:
(Check the appropriate box.)

[X] Stipulated Sum, in accordance with Section 4.2
(Paragraphs deleted)
below

(Based on the selection above, complete Section 4.2, 4.3 or 4.4 below.)

§ 4.2 Stipulated Sum

§ 4.2.1 The Contract Sum shall be ($), subject to additions and deductions as provided in the Contract Documents.

§ 4.2.2 Alternates

§ 4.2.2.1 Alternates, if any, included in the Contract Sum:

Item	Price

§ 4.2.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

Item	Price	Conditions for Acceptance

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§ 4.2.3 Allowances, if any, included in the Contract Sum: Project Material Allowances included in the Stipulated Sum are listed on Contractor's Bid Form, attached hereto as Exhibit C, and made a part hereof. No quantity limitations shall apply to the Project. The allowances shall be solely owned by the Owner and, as such, the Owner shall have the sole discretion relating to the use of these allowances. Furthermore, any unused portion of the allowances shall be deducted from the Contractor's Contract Sum. The Contractor shall receive no compensation on the unused portion of the allowances. The Contractor will be required to furnish documentation to the Owner evidencing the expenditures to be charged to the allowance and the reasons therefor prior to the Owner's approval of expenditures from the allowances.

(Table deleted)
§ 4.2.4 Unit prices, if
(Paragraphs deleted)
any, are listed on Contractor's Bid Form, attached hereto as Exhibit C, and made a part hereof.
(Table deleted)
§ 4.3 Cost of the Work Plus Contractor's Fee without a Guaranteed Maximum Price
§ 4.3.1 Intentionally deleted.

(Paragraph deleted)
(Table deleted)
(Paragraphs deleted)
§ 4.4 Cost of the Work Plus Contractor's Fee with a Guaranteed Maximum Price
§ 4.4.1 Intentionally deleted.

(Paragraphs deleted)
(Table deleted)
(Paragraphs deleted)
(Table deleted)
(Paragraphs deleted)
(Table deleted)
(Paragraphs deleted)
(Table deleted)
(Paragraphs deleted)
§ 4.5 Liquidated damages, if any:
(Insert terms and conditions for liquidated damages, if any, to be assessed in accordance with Section 3.4.)

(Paragraphs deleted)
ARTICLE 5 PAYMENTS
§ 5.1 Progress Payments
§ 5.1.1 In accordance with the provisions of AIA A232-2019 General Conditions of the Contract, based upon Applications for Payment submitted to the Construction Manager by the Contractor, and Certificates for Payment issued by the Construction Manager and Architect, the Owner or their designated representative shall make progress payments on account of the Contract Sum, to the Contractor, as provided below and elsewhere in the Contract Documents.

§ 5.1.2 In accordance with the provisions of AIA A232-2019 General Conditions of the Contract. The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

Except as set forth elsewhere in the Contract Documents, payments to the Contractor will be made monthly for work completed as of the last calendar day of the month or during a period of one calendar month ending on a day mutually agreed to by Owner and Contractor provided that all requirements of the Contract Documents have been and are complied with by the Contractor.

§ 5.1.3 Provided that an Application for Payment is received by the Construction Manager not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the last day of the following month. If an Application for Payment is received by the Construction Manager after the application date fixed above, payment of the amount certified shall be made by the Owner not later than sixty (60) days after the Construction Manager receives the Application for Payment. The Contractor hereby expressly waives any rights to penalties, interest,

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and attorney's fees that the Contractor has or may have under the Pennsylvania Prompt Pay Act, 62 Pa.C.S.A. § 3931, et seq. as amended from time to time.

§ 5.1.4 Progress Payments Where the Contract Sum is Based on a Stipulated Sum

§ 5.1.4.1 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Construction Manager and Architect may require. This schedule of values, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.4.2 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.4.3 In accordance with AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.4.3.1 The amount of each progress payment shall first include:

.1 That portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the total Contract Sum allocated to that portion of the Work in the schedule of values, less the retainage; and;

.2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing.

§ 5.1.4.3.2 The amount of each progress payment shall then be reduced by:

.1 The aggregate of any amounts previously paid by the Owner;

.2 The amount, if any, for Work that remains uncorrected and for which the Construction Manager or the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A232–2019;

.3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;

.4 .4 For Work performed or defects discovered since the last payment application, any amount for which the Construction Manager or the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A232–2019; and

.5 Retainage withheld pursuant to Section 5.1.7.

(Paragraphs deleted)

§ 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to when the Work of this Contract is substantially complete, the Owner may withhold retainage as set forth in Section 9.3.4 of the AIA A232-2019.

(Paragraphs deleted)

§ 5.2 Final Payment

§ 5.2.1 Final Payment Where the Contract Sum is Based on a Stipulated Sum

§ 5.2.1.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor as set forth in the General Conditions and when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment; and

.2 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect or Construction Manager; and

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.3 the Contractor has completed all Work in compliance with all applicable codes, law, ordinances, and regulations which affect the Project and the Work has passed all inspections.

§ 5.2.1.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the final Certificate for Payment or Project Certificate for Payment, or as follows:

§ 5.2.2 Final Payment Where the Contract Sum is Based on the Cost of the Work with or without a Guaranteed Maximum Price

§ 5.2.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

.1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A232–2019, and to satisfy other requirements, if any, which extend beyond final payment;

.2 the Contractor has submitted a final accounting for the Cost of the Work, pursuant to Exhibit B, Determination of the Cost of the Work and a final Application for Payment; and

.3 a final Certificate for Payment or Project Certificate for Payment has been issued by the Architect in accordance with Exhibit B, Determination of the Cost of the Work.

(Paragraphs deleted)

§ 5.3 Except as otherwise set for in the Contract Documents, payments due and unpaid under the Contract shall bear
(Paragraphs deleted)
interest.

ARTICLE 6 DISPUTE RESOLUTION

§ 6.1 Initial Decision Maker

The Architect will serve as Initial Decision Maker pursuant to Article 15.2 of AIA Document A232–2019, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.
(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)

Godshall Kane O'Rourke Architects, LLC (GKO Architects, LLC)
300 Brookside Avenue
Ambler Yards, Building 18, Suite 150
Ambler, PA 19002

§ 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A232–2019, the method of binding dispute resolution shall be as follows:
(Check the appropriate box.)

[X] Litigation in in the Court of Common Pleas of Montgomery County.

[ ] Other: *(Specify)*

Per Article 15.4 of the General Conditions

ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 Where the Contract Sum is a Stipulated Sum

§ 7.1.1 The Contract may be terminated by the Owner as provided in Article 14 of AIA Document A232–2019.

§ 7.1.1.1
(Paragraphs deleted)

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Intentionally deleted.

§ 7.1.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A232–2019.

(Paragraphs deleted)

ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Terms in this Agreement shall have the same meaning as those in AIA Document A232-2019 as amended for the Project. Where reference is made in this Agreement to a provision of AIA Document A232–2019, General Conditions, or another Contract Document, the reference refers to that provision as amended, modified, deleted or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:
(Name, address, email address, and other information)

Ron Linke, Business Administrator
Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

§ 8.3 The Contractor's representative:
(Name, address, email address, and other information)

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

§ 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in Article 11 of the AIA Document A232™–2019, Standard Form of Agreement Between Owner and Contractor, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as amended for the Project, and elsewhere in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in Article 11.1.2 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as amended for the Project, and elsewhere in the Contract Documents.

§ 8.6

(Paragraphs deleted)
Intentionally deleted.

§ 8.7 Relationship of the Parties

The Contractor accepts the relationship of trust and confidence established by this Agreement and covenants with the Owner to cooperate with the Architect and Construction Manager and exercise the Contractor's skill and judgment in furthering the interests of the Owner; to furnish efficient business administration and supervision; to furnish at all times an adequate supply of workers and materials; and to perform the Work in an expeditious and economical manner consistent with the Owner's interests. The Owner agrees to furnish and approve, in a timely manner, information required by the Contractor and to make payments to the Contractor in accordance with the requirements of the Contract Documents.

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§ 8.8 Other provisions:

§ 8.8.1 The Owner and Contractor acknowledge that no representations, inducements, promises, or agreements, orally or otherwise, have been made by any party or by anyone acting on behalf of an party which are not embodied in this Agreement, and that any agreement, statement or promise that is not contained in this Agreement shall not be valid or binding on any party and shall not have any force or effect.

§ 8.8.2 As between Architect, Construction Manager and Contractor, it is understood that the Architect and Construction Manager shall not be held responsible to Contractor for any errors or omissions on the part of Contractor, including, but not limited to, the Contractor's failure to adhere to the plans and specifications, regardless of whether or not the Architect or Construction Manager is performing observation services.

ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

.1 AIA Document A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition, as amended for the Project

.2 AIA Document A232™–2019, General Conditions of the Contract for Construction, Construction Manager as Adviser Edition, as amended for the Project

(Paragraphs deleted)

.3 Drawings – Exhibit A

(Table deleted)

.4 Specifications – Exhibit B

(Table deleted)

.5 Addenda, if any:

Number	Date	Pages

(Paragraph deleted)

.6 Other Exhibits:

Exhibit C – Contractor's completed Bid Form
Exhibit D – Contractor's executed Non-Collusion Affidavit
Exhibit E – Contractor's executed Public Work Employment Verification Form

(Paragraphs deleted)

Exhibit F – Contractor's executed Performance and Payment Bonds

(Table deleted)

Exhibit G - Contractor's Certificate of Insurance

This Agreement is entered into as of the day and year first written above.

OWNER *(Signature)*	**CONTRACTOR** *(Signature)*
(Printed name and title)	*(Printed name and title)*

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SECTION 00 61 13 – PERFORMANCE AND PAYMENT BOND FORMS

A. Within ten (10) days of receipt of the Notice of Intent to Award, the successful Bidder shall furnish a Performance Bond (00 61 14) and a Payment Bond (00 61 15) in the forms provided in these Bid Documents, each in the amount of one hundred percent (100%) of the Contract Sum. No other forms will be accepted. There is no implied permission to reproduce this document. The original document purchased by the user is intended to be consumed in the course of this project.

B. The Attorney-in-Fact who executes the Performance and Payment Bonds on behalf of the surety shall affix to the bonds a certified and current copy of its Power of Attorney, authorizing said Attorney-in-Fact to act on behalf of the surety, and a valid Certificate of Authority from the Pennsylvania Department of Insurance. The Power of Attorney must be dated the same day as the bonds and both the bonds and Power of Attorney shall have affixed the raised corporate seal of the surety.

C. The Performance and Payment Bonds must be executed by a surety licensed and authorized to conduct business within the Commonwealth of Pennsylvania and named in the current list of companies holding Certificates of Authority as accepted sureties on Federal Bonds and as acceptable reinsuring companies as published in Circular 570 (as amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department, and the amount of the bond shall not exceed the underwriting risk of such surety set forth in said Circular or revision thereof.

END OF SECTION 00 61 13

SECTION 00 61 14 – PERFORMANCE BOND

And Now, we _____ as Principal (the "Principal"), and _____, a Corporation organized and existing under the laws of the _____ of _____, and authorized to do business in the Commonwealth of Pennsylvania as Surety (the "Surety"), are jointly and severally held and firmly bound to the Pottsgrove School District, its successors and assigns as Obligee, (the "Obligee"), for the performance of the Contract hereinafter identified and incorporated herein by this reference in the sum of _____, lawful money of the United States of America to be paid to the Obligee; to which performance or payment, well and truly to be made, we bind ourselves and each of our successors and assigns, jointly and severally.

I. RECITALS

WHEREAS, the Principal has submitted to the Obligee a certain Bid, dated _____ (the "Bid"), to perform certain _____ (Name of Contract) Work for the Obligee, in connection with the **Pottsgrove School District, Pottsgrove High School Facility and Athletic Improvement Project, Work Scope Contract Number** _____, pursuant to plans, specifications and other related documents constituting the Contract Documents, which are incorporated into the Bid by reference (the "Contract Documents"); and

WHEREAS, the Obligee, is a "contracting body" under provisions of Act No. 385 of the General Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known as and cited as the "Public Works Contractors' Bond Law of 1967" (the "Act");

WHEREAS, the Act, in Section 3 (a), requires that, before an award shall be made to the Principal by the Obligee in accordance with the Bid, the Principal shall furnish this Bond to the Obligee, with this Bond to become binding upon the award of a contract to the Principal by the Obligee in accordance with the Bid; and

WHEREAS, it also is a condition of the Contract Documents that this Bond shall be furnished by the Principal to the Obligee and

WHEREAS, under the Contract Documents, it is provided, inter alia, that if the Principal shall furnish this Bond to the Obligee, and if the Obligee shall make an award to the Principal in accordance with the Bid, then the Principal and the Obligee shall enter into an agreement with respect to performance of such work (the "Agreement"), the form of which Agreement is set forth in the Contract Documents.

II. TERMS AND CONDITIONS OF BOND

NOW, THEREFORE, the terms and conditions of this Bond are and shall be that if:

(a) the Principal shall remedy, without cost to the Obligee, all defects, deficiencies or failures and any labor, materials or equipment performed or provided by the Principal in its performance of the Agreement which may develop during the period of one (1) year from the date of substantial completion by the Principal and final acceptance of the Obligee of the work to be performed under the Agreement in accordance with the Contract Documents, which defects, in the sole judgment of the Obligee or its legal successors in interests, shall be caused by or shall result from defective or inferior materials or workmanship.

(b) the Principal well, truly, and faithfully shall comply with and shall perform the Agreement in accordance with the Contract Documents, at the time and in the manner provided in the Agreement and in the Contract Documents, and if the Principal shall satisfy all claims and demands incurred in or related to the performance of the Agreement by the Principal or growing out of the performance of the Agreement by the Principal, and if the Principal shall indemnify completely and shall save harmless the Obligee and all of its officers, directors, agents or employees from any and all costs and damages which the Obligee and any or all of its officers, directors, agents and employees may sustain or suffer including, but not limited to, attorney's fees, costs, expenses and interest by reason of the failure of the Principal to do so, and if the Principal shall reimburse completely and pay to the Obligee any and all costs, damages and expenses, including interest and attorney's fees) which the Obligee and any or all of its officers, directors, agents and employees may incur by reason of any such default or failure by the principal and if the Principal shall remedy, without cost to the Obligee, all defects which may develop during the period of one (1) year from the date of substantial completion by the Principal and final acceptance of the Obligee of the work to be performed under the Agreement in accordance with the Contract Documents, which defects, in the sole judgment of the Obligee or its legal successors in interests, shall be caused by or shall result from defective or inferior materials or workmanship, then this Bond shall be void; otherwise, this Bond shall be and shall remain in force and effect.

We further agree to indemnify and hold harmless the Obligee against any and all costs, liabilities, expenses, attorney's fees and obligations which the Obligee sustains by reason of the failure of the Principal or the Surety to comply with the terms of the Contract Documents or this Obligation. This Bond is executed and delivered under and subject to the Act, to which reference hereby is made.

The Principal and the Surety agree that any alterations, changes or additions to the Contract Documents, or any alterations, changes or additions to the work to be performed under the Agreement in accordance with the Contract Documents, or any alterations, changes or additions to the Agreement, or any act of forbearance of either the Principal or the Obligee toward the other with respect to the Contract Documents and the Agreement, or the reduction of any percentage to be retained by Obligee as permitted by the Contract Documents and by the Agreement, shall not release in any manner whatsoever, the Principal and the Surety or either of them, their heirs, executors, administrators, successors and assigns, from liability and obligations under this Bond; and the Surety, for value received, waives notice of any such alterations, changes, additions, extensions of time, acts of forbearance or reduction of retained percentage.

It is further agreed that, in the sole discretion of the Obligee and upon notice therefrom, the Surety may be required to perform and carry out the provisions of the Agreement in the event of a breach thereof by the Principal, whereupon the rights and responsibilities of the Surety and the Obligee to each other shall be the same as those of the Principal and the Obligee immediately prior to the breach giving rise to the Surety's obligation hereunder. If the Surety does not proceed promptly to render such performance or cause such performance to be rendered by a third party satisfactory to the Obligee, then, the Surety shall be deemed to be in default on this obligation fifteen (15) days after the receipt of notice from Obligee that the Surety shall so proceed, and the Obligee shall be entitled to enforce against Surety any remedy it may then or thereafter have against the Principal.

It is expressly agreed that this Bond shall be deemed amended automatically and immediately, without formal and separate Amendments hereto, upon Amendment to the Contract Documents not increasing the Contract price in the aggregate by more than twenty (20%) percent of the Bond amount set forth herein, so as to bind the Principal and the Surety to the full and faithful performance of the Contract Documents as so amended. The term "Amendment" wherever used in this Bond and whether referring to this Bond, the Contract Documents, or the Agreement, shall include any alteration, addition, extension or modification of the Bond, Contract Documents and/or Agreement

The Principal and the Surety agree that any alterations, changes and/or additions to the Contract Documents, and/or any alterations, changes and/or additions to the work to be performed under the Agreement in accordance with the Contract documents, and/or any alterations, changes and/or additions to the Agreement, and/or any giving by the Obligee of any extensions of time for the performance of Agreement in accordance with the Contract Documents, and/or any act of forbearance of either the Principal or the Obligee toward the other with respect to the Contract Documents and the Agreement, and/or the reduction of any percentage to be retained by the Obligee as permitted by the Contract Documents and by the Agreement, shall not release, in any manner whatsoever , the Principal and the Surety, or either of them, or their heirs, executors, administrators, successors and assigns, from liability and obligations under this Bond; and the Surety, for value received, does waive notice of any such alterations, changes, additions, extensions of time, acts of forbearance and/or reduction of retained percentage.

If the Principal is a foreign corporation (incorporated under any laws other than those of the Commonwealth of Pennsylvania) then further terms and conditions of this Bond are and shall be that the Principal or the Surety shall not be discharged from liability on this Bond, nor this Bond surrendered until such Principal files with the Obligee a certificate from the Pennsylvania of Revenue evidencing the payment in full of all bonus taxes, penalties and interest, and a certificate from the Bureau of Employment and Unemployment Compensation of the Pennsylvania Department of Labor and industry, evidencing the payment of all unemployment compensation, contributions, penalties and corporations, subcontractors thereunder or for such liability has accrued but the time for payment has not arrived, all in accordance with provisions of the Act of June 10,1947, P.L. 493, of the Commonwealth of Pennsylvania.

Every action upon this Bond shall be instituted only in the Court of Common Pleas of Montgomery County, Pennsylvania, and the Surety and Principal hereby submit to the exclusive jurisdiction of said court and agree that the venue of said court shall be proper in all respects and shall consent to service of process by any means authorized by Pennsylvania law.

This Bond is executed and delivered under and subject to the Public Works Contract's Bond Law of 1967.

IN WITNESS WHEREOF, the Principal and Surety cause this Bond to be signed, sealed and delivered this_day of , 20_____

(Partnership Principal)

_____
(Name of Partnership)

Witness:

_____ By:_____(SEAL)
Partner

_____ By:_____(SEAL)
Partner

_____ By:_____(SEAL)
Partner

(Corporate Principal)

_____
(Name of Corporation)

ATTEST:

_____ By:_____(SEAL)
President

CORPORATE SEAL

or (if appropriate)

Witness:

_____ *By:_____
Authorized Representative

*Attach appropriate proof, dated as of the same date as the Bond, evidencing authority to execute in behalf of the corporation.

(Corporate Surety)

_____
(Name of Corporation)

Witness:

_____ **By:_____
Attorney-in-Fact

**Attach an appropriate power of attorney, dated as of the same date as the Bond, evidencing the authority of the Attorney-in-Fact to act in behalf of the Corporation. Attach a valid Certificate of Authority from the Pennsylvania Department of Insurance.

END OF SECTION 00 61 14

SECTION 00 61 15 – PAYMENT BOND

KNOW THESE MEN BY THESE PRESENTS that we, _____,
as Principal (the "Principal"), and_____,
a corporation organized and existing under laws of _____
of_____,
and authorized to do business in the Commonwealth of Pennsylvania, as Surety (the "Surety"), are held and firmly bound unto Pottsgrove School District as Obligee (the "Obligee"), as hereinafter set forth, in the full and just sum of_____Dollars
($_____)
lawful money of the United States of America, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WITNESSETH THAT:

WHEREAS, the Principal heretofore has submitted to the Obligee a certain Bid, dated ,20_____ (the "Bid"), to perform certain_____Work for the Obligee, in connection with the **Pottsgrove School District, Pottsgrove High School Facility and Athletic Improvement Project, Work Scope Contract Number _____,** pursuant to plans, specifications and other related documents, which are incorporated into the Bid by reference (the "Contract Documents"), as prepared by the Obligee.

WHEREAS, the Obligee, is a "contracting body" under the provisions of Act No. 385 of the General Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known as and cited as the "Public Works Contractors' Bond Law of 1967" the "Act");

WHEREAS, the Act, in Section 3 (a), requires that, before an award shall be made to the Principal by the Obligee in accordance with the Bid, the Principal shall furnish this Bond to the Obligee, with this Bond to become binding upon the award of a contract to the Principal by the Obligee in accordance with the Bid; and

WHEREAS, it also is a condition of the Contract Documents that this Bond shall be furnished by the Principal to the Obligee and

WHEREAS, under the Contract, it is provided, inter alia, that if the Principal shall furnish this Bond the Obligee, and if the Obligee shall make an award to the Principal in accordance with the Bid, then the Principal and the Obligee shall enter into an agreement with respect to performance of such work (the "Agreement"), the form of which Agreement is set forth in the

Contract Documents.

NOW, THEREFORE, the terms and conditions of the bond are and shall be that if the Principal and any subcontractor of the Principal to whom any portion of the work under the Agreement shall be subcontracted, and if all assignees of the Principal and of any such subcontractor, promptly pay or shall cause to be paid, in full, all money which may be due any claimant supplying labor or materials in the prosecution and performance of the work in accordance with the Agreement and in accordance with the Contract Documents, including any amendment, extension or addition to the Agreement and/or to the Contract Documents, for material furnished or labor supplied or labor performed, then this Bond shall be void, otherwise, the Bond shall be and shall remain in force and effect.

This Bond, as provided by the Act, shall be solely for the protection of claimants supplying labor or materials to the Principal or to any subcontractor of the Principal in the prosecution of the work covered by the Agreement, including any amendment, extension or addition to the Agreement. The term “Claimant", when used herein and as required by the Act, shall mean any individual, firm, partnership, association or corporation. The phase “Labor or Materials” when used herein and as required by the Act, shall include public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the site of the work covered by the Agreement. As required by the Act, the provisions of this Bond shall be applicable whether or not the material furnished or labor performed enters into and becomes a component part of the public building, public work or public improvement contemplated by the Contract Documents and the Agreement.

As provided and required by the Act, the Principal and the Surety agree that any claimant, who has performed labor or furnished material in the prosecution of the work in accordance with the Agreement and in accordance with the Contract Documents, including any amendment, extension or addition to the Agreement, and/or to the Contract Documents, and who has not been paid therefore, in full, before the expiration of ninety (90) days after the day on which such claimant performed the last of such labor or furnished the last of such materials for which payment is claimed, may institute an action upon this Bond, in the name of the claimant to recover any amount due the claimant for such labor or material; and may prosecute such action to final judgment and may have execution upon the judgment provided however, that: (a) any claimant who has a direct contractual relationship with any subcontractor of the Principal but has no contractual relationship, express or implied, with the Principal, may institute an action upon this Bond only if such claimant first shall have given written notice, served in the manner provided in the Act, to the Principal, within ninety (90) days from the date upon which such claimant performed the last of the labor or furnished the last of the materials for which payment is claimed, stating, with substantial accuracy, the amount claimed and the name of the person for whom the work was performed or to whom the material was furnished; and (b) no action upon this bond shall be commenced after the expiration of one (1) year from the day upon which the last of the labor was performed or material supplied, for the payment of which such action is instituted by the claimant; and (c) every action upon this Bond shall be instituted either in the appropriate court of the County where the Agreement is to be performed or of such other County as Pennsylvania statutes shall provide, or in the United States District Court for the district in which the project, to this Agreement relates, is situated, and not elsewhere. Every action upon this Bond shall be instituted only in the Court of Common Pleas of Montgomery County, Pennsylvania, and the Surety and Principal hereby submit to the exclusive jurisdiction of said court and agree that the venue of said court shall be proper in all respects and shall consent to service of process by any means authorized by Pennsylvania law.

The Principal and the Surety agree that any alterations, changes and/or additions to the Contract Document, and/or any alterations, changes and/or additions to the work to be performed under the Agreement in accordance with the Contract Documents, and/or any alterations, changes and/or additions to the Agreement, and/or any giving by the Obligee of any extensions of time for the performance of the Agreement in accordance with the Contract Documents, and/or any act of forbearance of either the Principal or the Obligee toward the other with respect to the Contract Documents and the Agreement, and/or the reduction of any percentage to be retained by the Obligee as permitted by the Contract Documents and by the Agreement, shall not release in any manner whatsoever, the Principal and the Surety, or either of them, their heirs, executors, administrators, successors and assigns, from liability and obligations under this Bond; and the Surety, for value received, does waive notice of any such alterations, changes, additions, extensions of time acts of forbearance and/or reduction of retained percentage.

It is expressly agreed that this Bond shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract Documents not increasing the contract price in the aggregate by more than twenty percent (20%) of the Bond amount set forth herein, so as to bind the Principal and the Surety to the full and faithful performance of the Contract Documents as so amended. The term “Amendment", wherever used in this Bond and whether referring to this Bond, the Contract Documents, or the Agreement, shall include any alteration, addition, extension or modification of the Bond, the Contract Documents, and/or Agreement.

If the Principal is a foreign corporation (incorporated under any laws other than those of the Commonwealth of Pennsylvania) then further terms and conditions of this Bond are and shall be that the Principal or the Surety shall not be discharged from liability on this Bond, nor this Bond surrendered until such Principal files with the Obligee a certificate from the Pennsylvania Department of Revenue evidencing the payment in full of all bonus taxes, penalties and interest, and a certificate from the Bureau of Employment and Unemployment Compensation of the Pennsylvania Department of Labor and Industry, evidence the payment of all unemployment compensation, contributions, penalties and interest due the Commonwealth from said Principal or any foreign corporations, subcontractors thereunder or for which liability has accrued but the time for payment has not arrived, all in accordance with provisions of the Act of June 10, 1947, P.L. 493, of the Commonwealth of Pennsylvania.

This Bond is executed and delivered under and subject to the Act, to which reference hereby is made.

IN WITNESS WHEREOF, the Principal and the Surety cause this Bond to be signed, sealed and delivered this_____day of_____, 20_____

(Individual Principal)

_____(SEAL)
(Signature of Individual)

Witness:

Trading and doing business as:

_____

_____

(Partnership Principal)

_____
(Name of Partnership)

Witness:

_____ By:_____(SEAL)
Partner

_____ By:_____(SEAL)
Partner

_____ By:_____(SEAL)
Partner

(Corporate Principal)

_____
(Name of Corporation)

ATTEST:

_____ By:_____(SEAL)
President

CORPORATE SEAL

or (if appropriate)

Witness:

_____ *By:_____
Authorized Representative

*Attach appropriate proof, dated as of the same date as the Bond, evidencing authority to execute in behalf of the corporation.

(Corporate Surety)

_____
(Name of Corporation)

Witness:

_____ **By:_____
Attorney-in-Fact

**Attach an appropriate power of attorney, dated as of the same date as the Bond, evidencing the authority of the Attorney-in-Fact to act in behalf of the Corporation. Attach a valid Certificate of Authority from the Pennsylvania Department of Insurance.

END OF SECTION 00 61 15

SECTION 00 72 00 - GENERAL CONDITIONS

1.01 GENERAL

A. The attached copy of AIA Document A232, General Conditions of the Contract for Construction, 2019 Edition, Articles 1 through 15, is hereby made a part of the Contract Documents and Specifications. There is no implied permission to reproduce this document. The original document purchased by the used is intended to be used during the course of this Project. This document shall always be the most recent form unless otherwise noted by CMTA Inc to be a certain year or edition posted by the AIA.

END OF SECTION 00 72 00

AIA® Document A232® – 2019

General Conditions of the Contract for Construction, *Construction Manager as Adviser Edition*

for the following PROJECT:
(Name, and location or address)

Pottsgrove High School Facilities & Athletic Improvement Project
Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

THE CONSTRUCTION MANAGER:
(Name, legal status, and address)

CMTA, Inc.
9519 Civic Way, Suite 100
Prospect, KY 40059

THE OWNER:
(Name, legal status, and address)

Pottsgrove School District
1301 Kauffman Road
Pottstown, PA 19464

THE ARCHITECT:
(Name, legal status, and address)

Godshall Kane O'Rourke Architects, LLC (GKO Architects, LLC)
300 Brookside Avenue
Ambler Yards, Building 18, Suite 150
Ambler, PA 19002

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document is intended to be used in conjunction with AIA Documents A132™–2019, Standard Form of Agreement Between Owner and Contractor, Construction Manager as Adviser Edition; B132™–2019, Standard Form of Agreement Between Owner and Architect, Construction Manager as Adviser Edition; and C132™–2019, Standard Form of Agreement Between Owner and Construction Manager as Adviser.

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TABLE OF ARTICLES

1 GENERAL PROVISIONS

2 OWNER

3 CONTRACTOR

4 ARCHITECT AND CONSTRUCTION MANAGER

5 SUBCONTRACTORS

6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

7 CHANGES IN THE WORK

8 TIME

9 PAYMENTS AND COMPLETION

10 PROTECTION OF PERSONS AND PROPERTY

11 INSURANCE AND BONDS

12 UNCOVERING AND CORRECTION OF WORK

13 MISCELLANEOUS PROVISIONS

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents. The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General and other Conditions), Instructions to Bidders, Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of addenda relating to bidding or proposal requirements.

§ 1.1.1.1 The Contractor is responsible to read the entire AIA A232-2019 General Conditions of the Contract for Construction as it has been modified from the original AIA Document A232-2019.

§ 1.1.2 The Contract. The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and the Construction Manager or the Construction Manager's consultants, (3) between the Owner and the Architect or the Architect's consultants, (4) between the Contractor and the Construction Manager or the Construction Manager's consultants, (5) between the Owner and a Subcontractor or Sub-subcontractor (6) between the Construction Manager and the Architect, or (7) except as provided in Article 6 of these General Conditions, between any persons or entities other than the Owner and Contractor. The Construction Manager and Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of their duties. Each Subcontractor, having received and reviewed the Contract Documents, as evidenced by its execution of a subcontract with the Contractor, agrees that these General Conditions have been incorporated in the Subcontractor's subcontract by reference and, to the extent such General Conditions conflict with the express provisions of the subcontract with respect to obligations Subcontractor may have to Owner, these General Conditions shall take precedence.

§ 1.1.2.1 Contractor acknowledges and warrants that it has closely examined all of the Contract Documents, that they are suitable and sufficient to enable the Contractor to complete the Work in a timely manner for the Contract Sum, and that they include all Work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in full compliance with all applicable codes, laws, ordinances, regulations and/or requirements of any local, state, federal or other governmental agency.

§ 1.1.3 The Work. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations and further including any Subcontractor and Sub-subcontractor Work, material suppliers, and/or any other entity from whom the Contractor is responsible whether on or off the site of the Project. The Work may constitute the whole or a part of the Project.

§ 1.1.3.1 The Work shall include, without limitation, the obligation of the Contractor to visit the Project site before submitting a Bid. Such site visit shall be for the purpose of familiarizing the Contractor with the conditions as they exist and the character of the operations to be carried on under the Contract Documents, including, without limitation, all existing site conditions, access to the site, and the physical characteristics of the site and surrounding areas.

§ 1.1.3.2 Nothing in these General Conditions shall be interpreted as imposing on either the Owner, Construction Manager or Architect, or their respective agents, employees, officers, directors or consultants, any duty, obligation or authority with respect to any items that are not intended to be incorporated into the completed Project, or that do not comprise the Work, including, but not limited to, the following: shoring; scaffolding; hoists; weatherproofing; or any temporary facility; or activity, since these are the sole responsibility of the Contractor.

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§ 1.1.4 The Project. The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by other Contractors, and by the Owner's own forces and Separate Contractors.

§ 1.1.5 Contractors. Contractors are persons or entities, other than the Contractor or Separate Contractors, who perform Work under contracts with the Owner that are administered by the Architect and Construction Manager. This includes all Prime Contractors who have mutual responsibility to each other.

§ 1.1.6 Separate Contractors. Separate Contractors are persons or entities who perform construction under separate contracts with the Owner administered by the Architect and Construction Manager.

§ 1.1.7 The Drawings. The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.7.1 The Drawings are diagrammatical and show the general arrangement and extent of the Work; exact locations and arrangements of parts shall be determined as the Work progresses and shall be subject to the Architect's approval. No extra compensation will be allowed due to conflicts, inconsistencies, or discrepancies between actual dimensions and those indicated. The right is reserved by the Architect to make any reasonable change in location of equipment, ductwork and piping prior to roughing in without involving additional compensation to the Prime Contractors. Each Prime Contractor shall coordinate its Work with the Work of others, so that interference between trades does not occur. Each Prime Contractor shall furnish and install offsets, bends, turns, and the like in connection with its Work to avoid interference with Work of other Contractors, to conceal Work where required, and to secure necessary clearance and access for operation and maintenance.

§ 1.1.7.2 Contractor shall carefully examine the Architectural, Mechanical, Plumbing, Electrical, and other Contract Drawings and Specifications. If any discrepancies occur between the Drawings or between the Drawings and Specifications, the Contractor shall report such discrepancies to the Architect and Construction Manager in writing and obtain written instructions as to the manner in which to proceed. No departures from the Contract Documents shall be made without prior written approval of the Architect and Construction Manager.

§ 1.1.8 The Specifications. The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.9 Instruments of Service. Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.10 Initial Decision Maker. The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§1.1.11 Construction Manager: The terms Program Manager (PM) and Owner's Representative shall be interchangeable with Construction Manager (CM) for this Project and shall mean CMTA, Inc.

§ 1.1.12 Owner: The term Owner shall refer to the Pottsgrove School District.

§ 1.1.13 All references to "Architect" shall mean "Architect/Engineer."

§ 1.1.14 Completion Date: The term Completion Date means any substantial completion, final completion, milestone, phase, or other time sensitive date identified in the Contract Documents.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as

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binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results unless it is specified that the Contract includes specific phases or elements to complete a certain part of the Work for reason of coordination or responsibility. Where the Specification has been divided into sections, it is for convenience in use. Unless otherwise specified, the scope of Work of each section shall be to furnish labor, materials, equipment, skill, erection, installation, services and related items for the phase of Work of that section, as required by the Drawings, as specified or as otherwise required to provide and complete the entire Work of the section.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.1.2 Notwithstanding anything else to the contrary in the Contract Documents, in the event of conflicts, inconsistencies or discrepancies between and/or within the Contract Documents and/or applicable codes, laws, ordinances, regulations and/or requirements of any state, federal or any other governmental agency, the Contractor shall (1) provide the better quality or greater quantity of Work or (2) comply with the more stringent requirement, or both, in accordance with the Architect's interpretation. The terms and conditions of this Section 1.2.1.2, however, shall not relieve the Contractor of any of the obligations set forth in Sections 3.2 and 3.7.

§ 1.2.1.3 In the event of conflicts or discrepancies among the Contract Documents, interpretations will be based on the following priorities:

.1 Change Orders
.2 Construction Change Directives
.3 Architect's Supplemental Instructions/Minor Change Orders
.4 Agreement
.5 Supplementary Conditions
.6 General Conditions
.7 Specifications
.8 Drawings
.9 Addenda
.10 Large-scale Drawings shall supersede smaller-scale Drawings
.11 Dimensions shall govern over scaling of the Drawings
.12 In the case of conflicts, inconsistencies or discrepancies in the Drawings or in the Specifications or within Documents not clarified by Addendum, the latter shall be submitted to the Construction Manager and Architect, who will promptly provide a determination in writing. In the case of a conflict, inconsistency, or discrepancy between and/or within the Drawings and Specifications not clarified by Addendum, the better quality or greater quantity of Work shall be provided in accordance with the Initial Decision Maker's or Architect's interpretation, and no additional compensation or extension of time will be allowed.

§ 1.2.1.4 If a minor change in the Work is found necessary due to actual field conditions, each Contractor shall submit detailed drawings of such departure for the approval by the Architect before making the change.

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. The Contractor represents that the Subcontractors, manufacturers, and suppliers engaged or to be engaged by it are and will be familiar with the requirements for performance by them.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings, and shall be in accordance with the definitions given in the latest edition of "The Random House Dictionary of the English Language." Certain terms used in the Contract Documents are defined in this Article. Definitions and explanations of this Article are not necessarily either complete or exclusive but are general for the Work to the extent they are not stated more explicitly in other provisions of the Contract Documents. These terms are:

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.1 Indicated: The term "indicated" is a cross reference to graphics, notes, or schedules on Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated," it is for purpose of helping the reader locate a cross reference, and no limitation of location is intended except as specifically noted.

.2 Directed, Requested, etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted" and "permitted" mean "directed by the Architect, after consultation with the Owner." However, no such implied meaning will be interpreted to extend the Architect's responsibility into Contractor's area of construction supervision.

.3 Approved: Where used in conjunction with Architect's response to submittals, requests, applications, inquiries, reports and claims by a Contractor, the term "Approved" will be held to limit the Architect's responsibilities and duties as specified in these General Conditions. In no case will "Approved" by the Architect be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

.4 Furnish: Except as otherwise defined in greater detail, the term "furnish" is used to mean supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations, as applicable in each instance.

.5 Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations at the Project site including, but not limited to, unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protection, cleaning, and similar operations, including, without limitation, the coordination with other Prime Contractors and Subcontractors as applicable in each instance.

.6 Relocate: The term "relocate" shall mean "move from the existing location to the new location installed complete and ready for use" for all items noted on the Drawings and/or indicated in the Specifications.

.7 Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.

.8 Coordinate: The term "coordinate" means to cooperate with related trades to furnish and install all connections between the trades in correct sequence, size, and location to create a complete system ready for the intended use.

.9 Verify: The term "verify" means to measure, investigate, review, test, and check the accuracy or correctness of and prove by demonstration, evidence, or testimony, the location, size, dimension, and condition of an item.

.10 Laws or Regulations: The terms "laws" and "regulations" each include, without limitation, laws, statutes, codes, ordinances, regulations, and lawful orders issued by authorities having jurisdiction, as well as rules, guidance, conventions and agreements within the construction industry that control performance of the Work, whether they are lawfully imposed by authorities having jurisdiction or not.

.11 Installer: The term an "Installer" is an entity engaged by a Contractor, either as an employee, Subcontractor or Sub subcontractor for performance of a particular construction activity, including, but not limited to, installation, erection, application and similar operations. Installer is required to be experienced in the operations it is engaged to perform. The term "experienced," when used with the term "Installer" means having a minimum of five (5) years of previous project experience similar in size and scope to this Project, and familiar with the precautions required, and has complied with requirements of the authorities having jurisdiction.

.12 Contract Description: The term "Contract Description" means a list of Specification Sections, narrative, and Contract Document references that will be the responsibility of the Contractor.

.13 "Agreement" and "Contract" is used interchangeably.

.14 The terms "project schedule", "construction schedule", or "schedule" shall be used interchangeably to mean the schedule of activities with dates and duration for each activity of work required for the project.

§ 1.2.4 Where the Work is shown in complete detail on only a portion of the Drawings or there is an indication of continuation, the remainder being shown in outline, the Work drawn out in detail shall be understood to apply to the other portions of the structure. The Drawings and Specifications are intended to be a common and complimentary set of documents. Anything shown on the Drawings but not in Specifications shall be equally binding as if both noted on the Drawings and called for in the Specifications.

§ 1.2.5 No measurement of a drawing by scale shall be used as working dimension. Working measurements shall be taken from figure dimensions. Work shown diagrammatically on Drawings shall be agreed upon for exact location

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before being installed. Where the activities of two or more trades are in close proximity, the Contractor shall confer with the other Prime Contractor(s) concerned before making its installation. Work installed by the Contractor in an arbitrary manner without regard for the work of other separate contractors or Prime Contractors shall be promptly repaired and/or replaced by the Contractor to the satisfaction of the Architect at no additional cost to the Owner.

§ 1.2.6 The Contractor shall carefully examine the civil, architectural, plumbing, electrical, fire protection and other Drawings and Specifications. If any conflicts, inconsistencies, or discrepancies occur between and/or within the Drawings and Specifications and is discovered after the submission of bids, the Contractor shall promptly report such a conflict, inconsistency, or discrepancy to the Architect in writing and obtain written instructions as to the manner in which to proceed. No departures from the Contract Documents shall be made without the prior written approval of the Architect and written notice to the Owner.

§ 1.2.7 The Drawings and Specifications, as a part of the Contract Documents, are for the purpose of illustrating and describing the general character and extent of the Work; and they are intended to agree and be mutually explanatory. Further, it is the intention that these instruments of service shall be complete in their meaning and shall represent completeness in design as well as any fragments thereof. It is the intent and purpose of the Specifications and Drawings to cover and include each item of material, machinery, apparatus, equipment, labor, and services necessary to properly install, equip, adjust, and put into perfect operation the respective portions of the installations specified, and to so interconnect the various items or sections of the Work as to form a complete and operating whole, and deliver the Work in the specified time. Any apparatus, machinery, material, equipment, labor, and services not specifically mentioned which may be found necessary to complete or perfect any portion of the Work in a substantial manner, and in compliance with the requirements stated, implied, or intended in the Contract Documents, shall be furnished without extra cost to the Owner. This shall include all material, devices, or methods peculiar to the type of construction furnished and installed by the Contractor.

§ 1.2.8 If the Contractor, in the course of the Work, finds any discrepancy between the Drawings and the physical conditions of the locality, or any errors in Drawings or in the layout as given by the points and instruction, the Contractor shall immediately inform the Construction Manager and Architect in writing and the Construction Manager and Architect, with reasonable promptness, shall verify the same. Any work done after such discovery, until authorized, shall be done at the Contractor's risk.

§ 1.2.9 In Multiple Prime Contract construction where the Contract Documents duplicate the same work or materials under more than one Prime Contract or subcontract, such duplication shall be settled by the Construction Manager and Architect in writing upon request of a Prime Contractor concerned prior to submission of Bid. Any such duplication which may exist in the Contract Documents after Bids are received will be interpreted by the Construction Manager and Architect as having duplicate values in the multiple contracts or subcontracts and proper credit to the Owner, therefore shall be made by the Contractors as the Architect shall designate.

§ 1.2.10 Division 01 shall govern the execution of all Specification Sections.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement. Unless otherwise indicated, any reference to a Section means the Section of these General Conditions, including any subsections thereof.

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 Except as otherwise agreed to between Owner and Architect, the Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other

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purposes in connection with the Project is not to be construed as publication in derogation of any reserved rights thereto.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, or the Agreement, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants, as applicable.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.6.3 Written Notice

Written notice shall be deemed to have been duly served if delivered by registered or certified mail or by courier service providing proof of delivery to party's respective address identified in the Agreement, or by electronic transmission provided that the party providing notice receives a delivery notification confirming receipt of its sent communication.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon written protocols governing the transmission and use of, and reliance on, Instruments of Service or any other information or documentation in digital form.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to written protocols governing the use of, and reliance on, the information contained in the model shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Construction Manager and the Architect do not have such authority. The term "Owner" means the Owner or the Owner's authorized representative and provided, however, the Construction Manager and Architect shall have the authority to act on behalf of the Owner with respect to providing notification, administering or enforcing the Contract Documents.

§ 2.1.2 Intentionally deleted.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Intentionally deleted.

§ 2.2.2 Intentionally deleted.

§ 2.2.3 Intentionally deleted.

§ 2.2.4 Intentionally deleted.

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§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 The Owner shall retain a construction manager adviser lawfully practicing construction management in the jurisdiction where the Project is located. That person or entity is identified as the Construction Manager in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.4 If the employment of the Construction Manager or Architect terminates, the Owner shall employ a successor construction manager or architect to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Construction Manager or Architect, respectively.

§ 2.3.5 The Owner shall not be responsible for furnishing surveys or other information as to the physical characteristics, legal limitations of, or utility locations for the site of the Project. The Contractor shall confirm the location of each utility, shall excavate and dispose of each on-site utility, and shall cap each off-site utility as required by the Work and as may be included in the Contract Documents. The Contractor represents that it is familiar with the Project site and has received all information it needs concerning the condition of the Project site. The Contractor represents that it has inspected the location of the Work and has satisfied itself as to the condition thereof, including, but not limited to, all structural, surface, and reasonably ascertainable subsurface conditions. Based upon the foregoing inspections, understandings, agreements and acknowledgments, the Contractor agrees and acknowledges: (1) that the Contract Sum is just and reasonable compensation for all Work, including, without limitation, foreseen and foreseeable risks, hazards and difficulties in connection therewith, and (2) that the Contract Time is adequate for the performance of the Work. The Contractor shall have no claims for surface or reasonably ascertainable subsurface conditions encountered. The Contractor shall exercise special care in executing subsurface Work in proximity of known subsurface utilities, improvements, and easements.

§ 2.3.6 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.7 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3.8 The Owner shall forward all communications to the Contractor through the Construction Manager and shall also provide the same communications to the Architect about matters arising out of or relating to the Contract Documents. Other communications shall be made as set forth in Section 4.2.6.

§ 2.3.9 The Contractor shall confirm the location of all utilities on the site prior to the commencement of any Work on site. To the extent required for the execution of the Work, the Contractor shall provide all temporary or permanent connections, terminations, removal, or alterations of the utility services to the site. Individual responsibilities of the separate Prime Contractors are delineated further in the Specifications.

§ 2.3.10 The Owner will provide such test borings and information that it has as to the existing subsurface conditions and site geology. The Owner does not assume any responsibility whatsoever with respect to sufficiency or accuracy of borings made, or of the logs of test borings, or of other investigations, or of the interpretations made thereof, and there is no warranty or guarantee, express or implied, that the conditions indicated by such investigations, borings, logs, or other information are representative of those existing throughout the Project site. There is no warranty or guarantee, express or implied, that unforeseen developments may not occur.

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§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents or fails to adequately staff the Project with the proper management, supervision, materials and workforce, including its duty to proceed expeditiously with adequate forces so as to maintain the Project schedule, achieve the Project milestones, and substantial completion, and fails within as required by Section 12.2 or fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. Upon notice from the Owner, the Contractor shall resume performing such Work. This right shall be in addition to and not in restriction or derogation of the Owner's rights under Article 14 hereof. The Owner's right to stop the Work shall not relieve the Contractor of any of its responsibilities and obligations under or pursuant to the Contract Documents.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to adequately staff the Project with the proper management, supervision, materials and workforce, including its duty to proceed expeditiously with adequate forces so as to maintain the Project schedule, achieve the Project milestones, and substantial completion, and fails within a seven-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect.. Notwithstanding the above, Owner shall not be required to comply with the notice provisions hereof and may proceed to correct such default and neglect if Contractor fails to, within a 24-hour period after receipt of written notice from the Owner, commence and continue correction of such default and neglect where further delay would cause disruption to the Project schedule. Owner shall have the further right to carry out work without any prior notice to Contractor, in an emergency affecting safety of persons or property, and said work is necessary to prevent threatened damage, injury or loss. The right of the Owner to carry out the Work pursuant to this Section 2.5 shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity. The Owner's rights set forth in Sections 2.4 and 2.5 hereof shall be in addition to all other rights of the Owner granted in the Contract Documents, at law, or in equity. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including, but not limited to, Owner's expenses, attorneys' fees and compensation for the Construction Manager's and Architect's and their respective consultants' additional services made necessary by such default, neglect, or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect, after consultation with the Construction Manager. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

§ 2.6 Limitation of Responsibility

In no event shall the Owner, Construction Manager, and Architect have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents. Hence, the Owner and Contractor hereby acknowledge and agree that the Owner has retained the Contractor as an independent contractor to perform the Work on the Project. It is expressly understood and agreed that the presence on the jobsite of the Owner's visiting officers or employees, the Owner, Architect, Construction Manager, or supervisory personnel employed by Owner, and the making by such personnel of any inspections of the Contractor's Work, materials, tools or equipment, or of the finished Work of the Contractor and their approval of same, or failure to take exception thereto, shall in no way relieve the Contractor from its absolute responsibility to perform its Work and furnish its materials in accord with the requirements of the Contract Documents. Any failure by the Owner or Architect to take exception to any Work of the Contractor shall not constitute a ratification or approval of the Work or work methods employed by the Contractor if the same did not in fact comply with the requirements of the Contract Documents.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required by applicable laws in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall

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have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 Where the term "Contractor" is modified in any way, such as, without limit, "this Contractor", "Plumbing Contractor", "HVAC Contractor" or "Mechanical Contractor", "General Contractor", "Electrical Contractor", the modified term shall be deemed to refer to the Prime Contractor, but such meaning does not relieve the Contractor from his responsibility for all Work, whether or not such Work is sublet or subcontracted. The Contractor shall perform the Work in strict accordance with the Contract Documents. The plural term "Prime Contractors" or "Multiple Prime Contractors" refers to persons or entities who perform construction under contracts with the Owner that are administered by the Construction Manager and Architect. The term does not include the Owner's own forces, including persons or entities under separate contracts not administered by the Construction Manager.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor. The Contractor shall be responsible for the coordination of its Work with the other Prime Contractors. The Owner, Architect and its consultants, and the Construction Manager and its consultants, shall not be responsible for coordination of the Contractor's Work.

§ 3.1.4 The Site and Athletic Improvements Contractor is designated as the Project Coordinator for this Project unless noted otherwise. See all of Articles 3 and 6 for additional information.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

§ 3.2.2 The Contractor shall carefully study and compare the Drawings, Specifications, Addendum, and other Contract Documents relative to the Work, shall take field measurements of any existing conditions related to the Work, and shall observe any conditions at the Project site affecting the Work. Any design errors, omissions, or inconsistencies noted by the Contractor shall promptly be reported to the Construction Manager and Architect. Contractor acknowledges that the Contract Documents are full and complete, are sufficient to have enabled it to determine the Contract Sum and that the Drawings, the Specifications and all Addenda are sufficient to enable such Contractor to construct the Work outlined therein in accordance with applicable laws, statutes, ordinances, codes, building codes and regulations of any local, state, federal or any other governmental agency, and otherwise to fulfill all of its obligations under the Contract Documents.

§ 3.2.2.1 Except as to any reported errors, inconsistencies or omissions that have been acknowledged and corrected by the Architect and Construction Manager via Addendum, and to concealed or unknown conditions defined in Section 3.7.4 by executing the Agreement, the Contractor represents the following:

.1 The Contract Documents are sufficiently complete and detailed for the Contractor to: (1) perform the Work required and to produce the results intended by the Contract Documents; and (2) comply with all requirements of the Contract Documents.

.2 The Work required by the Contract Documents, including, but not limited to, all construction details, construction means, methods, procedures, and techniques necessary to perform the Work, use of materials, selection of equipment, and requirements of product manufacturers are consistent with: (1) good and sound practices within the construction industry; (2) generally prevailing and accepted industry standards applicable to Work; (3) requirements of any warranties applicable to the Work; and (4) all laws, statutes, ordinances, regulations, rules, orders, codes, and building codes of any state, federal or any other governmental agency which bear upon Contractor's performance of the Work.

§ 3.2.3 The Contractor shall satisfy itself as to the accuracy of all dimensions and locations. In all cases of interconnection of its Work with existing or other Work, the Contractor shall verify at the site all dimensions relating to such existing or other Work. Any errors due to the Contractor's failure to verify all such locations or dimensions shall be promptly rectified by the Contractor without any additional cost to the Owner.

§ 3.2.3.1 Measurement

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Before ordering any materials or doing any Work, each Contractor and each Subcontractor shall verify measurements at the Project site and shall be responsible for the correctness of such measurements. No extra charge by the Prime Contractors or compensation to the Prime Contractors will be allowed on account of differences between actual dimensions and the dimensions indicated on the Drawings. Any difference which may be found shall be submitted by the Prime Contractor to the Architect in writing for resolution before proceeding with the Work.

§ 3.2.3.2 Prior to proceeding with any Work, and in sufficient time as not to delay the Work, the Contractor shall:

.1 Review, compare and analyze the Contract Documents and any information or surveys provided by the Owner; and

.2 Inspect and check such portion of the Work for proper fit and matching with continuous Work and for proper coordination with other Work and the Work of the Owner or of separate contractors; and

.3 Verify all dimensions and measurements with actual field conditions at the Project.

§ 3.2.3.3 The Contractor shall immediately notify the Owner, Construction Manager, and Architect of any errors, omissions or inconsistencies noted as the result of the Contractor's activities under Section 3.2.3 as a request for information submitted to Construction Manager in such form as the Construction Manager and Architect may require. If the Contractor knows or reasonably should know of any such error, omission or inconsistency and proceeds with the construction in question without first giving such notice, any claim for an adjustment to the Contract Sum or the Contract Time shall be deemed waived and released and the Contractor and its Surety shall assume all responsibility and liability on a joint and several basis for such performance and shall indemnify the Owner for all costs, expenses, losses and damages incurred by the Owner, including, but not limited to, legal fees, costs, and expenses, incurred by the Owner as the result thereof, including any cost to repair, correct or rework the construction in question.

§ 3.2.4 If the Contractor believes that additional cost or time will be required as a direct result of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3 and its sub-Sections, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3 and its sub-Sections, the Contractor shall pay such costs and damages to the Owner, subject to section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.2.5 The Contractor shall review the drawings and the Work of others to determine if that Work affects the Contractor's planned Work and also to coordinate and schedule all required Work.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner, the Construction Manager, and the Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Contractor shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.1.1 No alleged verbal agreement or conversation with any officer, agent or employee of the Owner, Construction Manager or Architect, either before or after the execution of the Contract, shall affect or modify the terms or obligations herein contained. Failure to comply with any or all of the requirements of this Section 3.3 will not relieve the Contractor from the responsibility of properly estimating the difficulty or cost of successful completion of the Work, nor from the responsibility for the faithful performance of the provisions of this Contract. Modifications or changes may be made in writing only. This requirement may not be waived under any circumstances.

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§ 3.3.1.2 When more than one major phase is being constructed at different locations of the Project site, supervision must be assigned to each phase when Work of that Agreement is being performed. When performing construction Work to maintain the progress schedule requires extended hours, multiple shifts, and/or additional workdays, adequate supervision shall be required during these times. The competence level and ability of supervisory personnel must be adequate to perform the construction activities involved.

§ 3.3.1.3 Although these various second level supervision personnel may be reassigned from time to time, the Contractor shall retain one superintendent with full responsibility while performing Work on the Project. Article 3.9 of these General Conditions contains the full requirements for Contractor's Superintendent and Project Manager.

§ 3.3.1.4 The Contractor, his employees or his subcontractors shall not install any product or equipment in a manner that is in direct conflict with the manufacturer's recommended requirements. If the manufacturer of the product or equipment has requirements that cannot be met by the specific application indicated, the Contractor shall bring this information to the attention of the Architect. Products or equipment that are installed contrary to their manufacturer's requirements shall be replaced at no additional cost to the Owner unless specifically authorized in writing by the Architect.

§ 3.3.1.5 The Project involves numerous complex plumbing, mechanical, electrical, and general construction installations, Contractor's representatives shall be sufficiently familiar with these trades to provide intelligent and efficient supervision, coordination and scheduling through all phases of work.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Construction Manager or Architect in their administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

§ 3.3.3.1 A Prime Contractor's failure to perform their Work or whose negligence in performing their Work impacts other Prime Contractors or separate contractors shall be responsible for costs or damages incurred by the other contractors that are necessary to maintain the Project Schedule. Prime Contractors shall be responsible for costs or damages incurred by Owner and the other Contractors, including but not limited to attorney fees and additional compensation of Construction Manager and Architect.

§ 3.3.3.2 The Contractor has reviewed the substantial completion dates and times for each milestone, phase and the entire Work of the Project set forth in the Contract Documents, agrees that such dates and times are reasonable and commits to achieve them. The Contract Sum includes costs associated with completion by those dates and times, including, but not limited to, costs associated with out-of-sequence work, come-back work, stand-by work, stacking of trades, coordination with the schedules and work of other Prime and separate contractors, allowing sufficient time, work and storage areas, and site access for other Prime and separate contractors to timely progress and complete their work, and overtime, expediting, and acceleration that may be required to complete the Work by those dates and times. The Contractor acknowledges that the Contract Time has been evaluated prior to submission of its Bid. After Award of Contract, no claim for additional compensation will be considered based solely upon the Contractor's costs of performing the Work within the Contract Time.

§ 3.3.4 The Site and Athletic Improvements Contractor is designated as the Project Coordinator for this Project. The Project Coordinator and other Prime Contractors are responsible for coordination of the Work. The Project Coordinator is responsible for making all coordination decisions not mutually agreed to by all affected Prime Contractors. Disputes between or among the Project Coordinator and one or more other Prime Contractors and disputes in connection with the construction schedule, the furnishing of additional resources to meet the project schedule, job coordination and all aspects of the means and methods of construction shall be submitted promptly to the Project Coordinator for a final construction decision. The Project Coordinator and the affected Prime Contractor or Contractors shall in connection with all submissions for a final construction decision provide actual written notice contemporaneously to the Construction Manager, Architect, and the Owner. The final construction decision of the Project Coordinator must, at all times, be consistent with content and intent of the Contract Documents and the latest

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accepted schedule and shall be subject to review and approval, rejection, or modification by the Construction Manager. The final construction decision of the Project Coordinator, as approved or modified by the Construction Manager, will be observed, accepted, and fully followed by all Prime Contractors and their Subcontractors on the project, subject only to the dispute resolution procedures set forth in Article 6 of these General Conditions. The progress of the Work in accordance with the final construction decision of the Project Coordinator, as approved or modified by the Construction Manager, shall not be delayed pending any such dispute resolution proceedings.

§ 3.3.5 The schedule of any Work affecting existing installations or facilities shall be coordinated with the other consultants, Owner and Construction Manager. At no time shall any of the Work or operations leading to Work defined in the Contract Documents interfere in any way with the Owner's day-to-day activities, service of power, light, heat, water, telephone, utilities, etc., which shall be maintained. Shutdown of utilities or equipment affecting existing operations will not be permitted except as provided below. Any premium time or additional cost to comply with these requirements shall be at the expense of the Contractor and shall be included in their bid. No shutdowns of existing installations and facilities, except by special permission, shall be scheduled between 5:00 a.m. and 6:00 p.m. All required shutdowns shall be during nights with the prior written approval of the Owner.

§ 3.3.6 Each Prime Contractor shall be responsible for the intermeshing of various other contracts and their own Work, so that no part will be left in an unfinished condition owing to disagreement among the various Prime Contractors as to where the Work of one begins and ends with reference to the Work of another. Prime Contractor shall deliver a fully completed Project to the Owner.

§ 3.3.7 Hierarchy of Coordination Authority.
Each Prime Contractor shall remain solely responsible for coordinating its own Work with the Work of other Prime Contractors, Separate Contractors, and the Owner's forces. Where the Site and Athletic Improvements Contractor is designated as the Project Coordinator, the Project Coordinator shall have authority to resolve coordination conflicts among Prime Contractors related to sequencing, interfacing, and logistical alignment of the Work.

The Construction Manager's involvement in coordination shall be limited to review of coordination decisions for consistency with the Project Schedule and the Contract Documents. Nothing herein shall be construed to assign responsibility to the Construction Manager or Architect for construction means, methods, techniques, sequences, procedures, or safety programs, nor to alter the allocation of responsibility otherwise established in the Contract Documents.

§ 3.4 Labor and Materials
§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor (excluding premium for Workers' Compensation and General Liability insurance as such insurance is provided by the Owner in accordance with the insurance provisions hereinafter), materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.1.1 Not later than 10 business days from the Contract Date, the Contractor shall provide a list of all products proposed for installation, including the name of the manufacturer of each for approval by the Owner and Architect. The list shall be tabulated by, and be complete for, each Specification Section. Where applicable, subcontractor's names shall be included in such list. Only those materials specified in the Contract Documents or approved by Addendum may be used in construction.

§ 3.4.1.2 Any material specified by reference to the number, symbol, or title of a specified standard, such as a Commercial Standard, a Federal Specification, a trade association standard, or other similar standard, shall comply with the requirements in the latest revision thereof, and any amendment or supplement thereto in effect on the date of submission of the Bid, except as limited to type, class or grade, or modified in such reference. The standards referred to, except as modified in the Specifications, shall have full force and effect as though printed in full in the Specification.

§ 3.4.1.3 The specific mention of a manufacturer's name, brand of material, equipment, etc., shall be considered as indicating a standard of quality, grade or type desired. Materials of manufacturers other than those mentioned throughout the specifications may be accepted if they are equal in quality and performance to those specified and

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written approval is given by the Architect prior to bid. Any other substitution request procedures are further defined in the Contract Documents.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect, in consultation with the Construction Manager, and in accordance with a Change Order or Construction Change Directive. After the Contract has been executed, the Owner and Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Specification Section 01 60 00 Product Requirements.

(Paragraph deleted)

§ 3.4.2.1 If the Contractor makes a request for substitution, such request shall be deemed to be Contractor's:

- **.1** Representation that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to the specified product.
- **.2** Representation that the Contractor will provide the same warranty for the substituted product that the Contractor would for the specified product.
- **.3** Certification that the cost data presented is complete and includes all related costs under this Agreement except the Architect's redesign costs and waives all claims for additional cost related to the substitution which subsequently become apparent.
- **.4** Representation that it will coordinate the installation of the accepted substitute product and make such changes as may be required for the Work to be complete in all respects without additional cost to the Owner;
- **.5** Representation that the use of the substituted product will not have an adverse effect on any other trade or the construction schedule. However, to the extent that the incorporation of a substituted item or assembly into the Work will require revisions or additions to the Work of other construction contracts, the Contractor proposing to use such substituted materials, products, or assembly represents that it will bear the cost of such revisions or additions for all applicable trades of Work at no change in the Contract Sum.

§ 3.4.3 Contract Sum Not Adjusted for Rising Costs: The Bid (and hence the Contract Sum) for the Contract must be guaranteed for the duration of this Project and shall thereby have incorporated within it any or all escalation factors related to market conditions. Notwithstanding any other provision in the Contract Documents to the contrary, Contractor's Contract Sum is intended to include all increases in cost, foreseen or unforeseen, including, without limitation, increases in costs arising from supply shortages, unusual delay in deliveries, increases in market prices for materials, labor, taxes and/or other causes beyond the Owner's control, all of which are to be borne solely by the applicable Contractor supplying the materials and/or labor to the Project. All loss and/or damage arising from any of the Work performed under this Agreement through unforeseen or unusual obstructions, difficulties or delays which may be encountered in the prosecution of same shall be borne solely by the applicable Contractor prosecuting the Work.

§ 3.4.4 Overtime: Any work necessary to be performed after regular working hours, on Sunday or Legal Holidays, shall be performed without additional expense to the Owner.

§ 3.4.5 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them. The Owner specifically reserves the right to reject any person the Owner deems unfit or unsuitable to be permitted on the Project Property. Upon written notice or verbal direction from the Owner or Construction Manager, the Contractor shall have all such persons removed from the Project. Obscene language, excessive noise, loitering, unauthorized use of kitchen facilities, smoking and possession, use or being under the influence of alcohol or a controlled substance, etc., will not be tolerated. The Contractor, its employees, subcontractors and suppliers are required to act in a professional and orderly manner when on and around the District property. Owner's right to declare such person unfit shall not be limited to the required exclusion of persons from Project site as set forth in Section 1-111 of the Pennsylvania Public School Code and/or Subchapter C.2 of the Child Protective Services Law.

§ 3.4.5.1 Competent Workmen: No person shall be employed to do Work under the Contract except competent and first-class workmen and mechanics. For projects where the total estimated cost is $25,000 or less, no workmen shall be regarded as competent and first class, within the meaning of Federal legislation, Title X, P.L. 103-227, Goal 2000, Educate America Act of 1994 and state regulations, except those who are duly skilled in their respective branches of

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labor, and who shall be paid not less than such rates of wages and for such hours' of work as shall be established and current rates of wages paid for such hours by employers of organized labor in doing of similar work in the district where the Work is being done. The Contractor shall not employ workers, means, materials or equipment which may cause strikes, work stoppages or any disturbances by workers employed by the Contractor or the Owner or Subcontractors in connection with the Work of the Project or the location thereof. The Contractor agrees that all disputes as to jurisdiction of trades shall be adjusted in accordance with any plan for the settlement of jurisdictional disputes which may be in effect either nationally or in the locality in which the Work is being performed and that it shall be bound and abide by such adjustments and settlements of jurisdictional disputes, provided that the provisions of this Section shall not be in violation of or in conflict with any provisions of law applicable to the settlement of such disputes. Should the Contractor fail to carry out or comply with any of the foregoing provisions, the Owner shall have the right, in addition to any other rights and remedies provided by the Contract Documents, at law or at equity, after three (3) days' written notice mailed or delivered to the last known address of the Contractor, for all or any portion of the Work, and, for the purpose of completing the Work, to enter upon the premises and take possession. Workmen shall strictly comply with Drug and Alcohol-Free Workplace program set forth in the Contract Documents.

§ 3.4.5.2 Contractors' personnel shall not make any remarks to any students or Owner's personnel that violate decency or cause embarrassment to that individual or the Owner. Failure to comply will result in dismissal from the Project.

§ 3.4.5.3 The Contractor shall abide by the following requirements, which shall apply to all Contractors, all Subcontractors of any tier, and all employees of all Contractors and all Subcontractors of any tier:

.1 They shall not socialize with the students, faculty, visitors, or patrons.

.2 They are prohibited from smoking, vaping, and other use of tobacco in buildings and on the grounds owned by or under the control of the Owner. Workers shall not smoke or use vaping devices within the limits of the Owner's property boundaries or as otherwise required by Federal legislation, Title X, P.L. 103-227, Goal 2000, Educate America Act of 1994 as amended from time to time, including without limitation, 20 U.S.C.A. Section 6081, et seq., the Pro-Children Act of 1994. Workers shall not possess or consume alcoholic beverages when within the limits of the Owner's property boundaries. The Contractor shall require its employees and agents, and its Subcontractor's employees and agents to work diligently and behave in an orderly manner at all times when at or about the Project site and shall remove from the Project any employee whose conduct is deemed objectionable. Unless otherwise approved by the Owner, persons performing Work shall not use the Owner's building facilities, including, without limitation, restroom facilities.

.3 They are not allowed to use the existing facilities, i.e., lunchroom, toilets, etc., unless specifically stated otherwise in these Contract Documents.

.4 They are not allowed in the existing facility except in areas being renovated.

.5 They shall not use radios on the site for music or entertainment purposes.

.6 They shall not possess, or consume, or be under the influence of alcoholic beverages when on site.

.7 They shall not use, possess, or be under the influence of any illegal substances (i.e., drugs, etc.) while on site.

Failure to comply with the above requirements may result in the Owner requiring the offending party to be removed from the Project and not allowed to return.

§ 3.4.6 Criminal History and Child Protective Services Information

.1 Prior to commencing Work, the Contractor and each Subcontractor shall submit on the prescribed form for each employee or person performing work at the Project site on behalf on the Contractor and Subcontractor prior to such person performing any work, a complete:

a. Original Pennsylvania and federal criminal background checks in accordance with Section 111 of the Public School Code of 1949, Act 34 of March 10, 1949, P.L. 30, No. 14, as amended by from time to time including, without limitation, by Act 114 of July 11, 2006, P.L. 1092, and Act 24 of 2011 (P.L. 112, No. 24) (24 P.S. Section 1-111, et seq.), both dated no later than sixty (60) months prior to the date presented to the Owner.

b. Official clearance statement obtained from the Pennsylvania Department of Public Welfare pursuant to Act 151 of December 16, 1994 (P.L. 1292), subchapter C.2 of the Child Protective Services Law, as amended from time to time, dated no later than sixty (60) months prior to the date presented to the Owner.

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c. The "Commonwealth of Pennsylvania Sexual Misconduct/Abuse Disclosure Release", that has been developed by the Pennsylvania Department of Education, pursuant to Act 168 of 2014, to be used by school entities and independent contractors of school entities and by applicants who would be employed by or in a school entity in a position involving direct contact with children to satisfy the Act's requirement of providing information related to abuse or sexual misconduct.

d. Properly completed and executed Form PDE-6004. The Contractor and its subcontractors shall refuse to employ any person as an independent contractor or employee whose Federal Criminal History record information indicates that such prospective employee has been convicted within 5 years immediately preceding the date of the report of any of the following offenses: (1) An offense under one (1) or more of the provisions of Title 18 of the Pennsylvania Consolidated Statutes, (2) An offense designated as a felony under the act of April 14, 1972 (P.L. 233, No. 64), known as "The Controlled Substance, Drug, Device and Cosmetic Act"; and (3) an out-of-State or Federal offense similar in nature to those crimes listed on Form PDE-6004; and

e. Any such other clearances as may be required by law.

.2 Owner shall review the submissions prior to each individual being permitted to come onto the Owner's property. The Owner reserves the right to reject any employee, agent, or subcontractor that the Owner determines in its sole discretion has an unsatisfactory criminal history or child abuse clearance. The Owner shall retain a copy of all such clearances in its file. Notwithstanding any other provision of this Contract, violation of this provision shall constitute grounds for immediate termination of the Contract by the Owner. Any individual rejected by the Owner shall not be permitted on the Owner's property. Owner's right to declare such person unfit shall not be limited to the required exclusion of persons from direct contact with children as set forth in Section 1-111 of the Pennsylvania Public School code and/or subchapter C.2 of the Child Protective Services Law.

.3 The Contractor shall notify the Owner in writing within seventy-two (72) hours if any person working on the Project under the Contractor's supervision (employee, agent, Subcontractor, Subcontractor's employee, etc.) is arrested or convicted of offense listed in 24 P.S. §1-111.1, or has an indicated or founded report of child abuse.. The Owner shall have the right to prohibit any such individual from coming onto its property.

§ 3.4.7 Public Works Employment Verification

Only individuals permitted to work in the United States of America and the Commonwealth of Pennsylvania shall be employed, in any capacity, in the performance of any Work under the Contract. The Contractor shall comply with the provisions of the Public Works Employment Verification Act (the "Act"), including but not limited to, setting forth the following information regarding the Act's requirements in all contracts with Subcontractors:

.1 The Contractor and every Subcontractor performing work under the Contract shall utilize the E-Verify Program (EVP) operated by the United States Department of Homeland Security to electronically verify employment eligibility of each new employee hired after January 1, 2013. The Contractor and each of its Subcontractors shall submit to the Construction Manager a separate and complete Verification Form, executed by a representative who has sufficient knowledge and authority to make the representations and certifications contained in the Verification Form, as required by the Public Works Employment Verification Act, Act No. 141, January 3, 2023 (formerly Senate Bill 637 and Act 127), before performing any Work on the Project.

.2 The Contractor, as precondition of the Contract, shall submit the Public Works Employment Verification Form to the Owner along with its Payment Bond, Performance Bond, Certificates of Insurance and Form Contract.

.3 Every Subcontractor shall submit completed Public Works Employment Verification Form to the Owner prior to performing work on the Project.

.4 During term of the Contract, each new employee hired by the Contractor, regardless of whether employee will be working onsite or offsite of the Project, shall be verified within five (5) business days of his or her start date.

.5 During the Project, new employee hired by Subcontractor, regardless of whether employee will be working onsite or offsite of the Public Work or otherwise, shall be verified within five (5) business days of his or her start date.

.6 Subcontracts between the Contractor and its Subcontractors and between Subcontractors of any tier and their Subcontractors are required to contain notification of applicability of the Act, information regarding

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use of the EVP and reference to the Departments website at www.dgs.state.pa.us to obtain a copy of the Form.

.7 The Contractor and all Subcontractors shall cooperate with the Department during investigation or audit arising under the Act.

.8 The Contractor and every Subcontractor shall maintain documentation of continued compliance with the Act by utilizing the EVP for new employees hired throughout duration of the Public Work Contract.

§ 3.4.8 Contractors Responsibility Provision

.1 The Contractor certifies, for itself and all its Subcontractors, that as of the date of its execution of its Bid and the Contract, that neither the Contractor, nor any Subcontractors, nor any suppliers, are under suspension or debarment by the Commonwealth of Pennsylvania or any governmental entity, instrumentality, or authority and, if the Contractor cannot so certify, then it agrees to submit, along with its Bid, a written explanation of why such certification cannot be made.

.2 The Contractor also certifies that as of the date of its execution of its Bid and the Contract, it has no tax liabilities or Commonwealth of Pennsylvania obligations.

.3 The Contractor's obligations pursuant to these provisions are ongoing from and after the effective date of the Contract through the termination date thereof. Accordingly, the Contractor shall have an obligation to inform the Owner if, at any time during the term of the Contract, it becomes delinquent in the payment of taxes, or other Commonwealth of Pennsylvania obligations, or if it or any of its Subcontractors are suspended or debarred by the Commonwealth of Pennsylvania, the federal government, or any other state or governmental entity. Such notification shall be made within 7 days of the date of suspension or debarment.

.4 The failure of the Contractor to notify the Owner of its suspension or debarment by the Commonwealth of Pennsylvania, any other state, or the federal government shall constitute an event of default of the Contract with the Owner.

.5 The Contractor agrees to reimburse the Owner for the reasonable costs of investigation incurred by the Owner for investigations of the Contractor's compliance with the terms of this or any other agreement between the Contractor and the Owner. Such costs shall include, but shall not be limited to, salaries of investigators, including, without limitation, overtime, travel and lodging expenses, legal fees, professional fees, Architect fees, Construction Management fees, expert witness fees, documentary fees and all other costs and expenses related thereto.

.6 The Contractor may obtain a current list of suspended and debarred Commonwealth of Pennsylvania Contractors by either searching the internet at http://www.dgs.state.pa.us/ or contacting the:

Department of General Services
Office of Chief Counsel
603 North Office Building
Harrisburg, PA 17125
Telephone No.: 717-787-6472
FAX No.: 717-787-9138

.7 Without being limited by the specificity of any requirements in the Contract Documents, the Contractor shall strictly comply with all applicable laws, ordinances, rules, orders, mandatory guidance, and regulations of all authorities having jurisdiction over the Project.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner, Construction Manager, and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Construction Manager or Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. The warranty provided in this Section shall be in addition to and not in limitation of any other warranty required by the Contract Documents or otherwise prescribed by law.

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§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.5.3 The Contractor hereby guarantees the Work to the full extent provided in the Drawings, Specifications, these General Conditions, and other Contract Documents. Materials and workmanship shall be guaranteed for a minimum of one (1) year from the date of Substantial Completion for the entire Project, except where a longer period is specified. The Contractor shall make good without cost to the Owner for any defective portion of the Work, including other Work damaged thereby, within seventy-two (72) hours of being notified of the defective work. Owner's rights and remedies hereunder shall be in addition to any other rights and remedies which the Owner may have pursuant to law, equity or other portions of the Contract Documents. Without limitation by the foregoing, the Contractor shall pay in addition for all damage to the Project resulting from defects in the Work and all costs and expenses necessary to correct, remove, replace and/or repair the Work and any other work or property which may be damaged in correcting, removing, replacing, or repairing the Work, as well as any consequential damages the Owner may suffer. If the Contractor fails to adhere to this provision, the Owner will be entitled to, in seeking to enforce its rights, recover, legal fees, consultant and expert witness fees, or any other expenses incurred by the Owner.

§ 3.5.4 The Contractor shall forward guarantee and warranty registration cards to the manufacturers in the name of the Owner showing the date of acceptable Substantial Completion of the Work as the beginning date for guarantee and warranty periods.

§ 3.6 Taxes

§ 3.6.1 The Contractor shall pay sales, consumer, use and similar taxes for the Work or portions thereof provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. The Owner is exempt (excluded) from sales and/or use tax in Pennsylvania on certain transactions. Contractor and all subcontractors shall bid and shall purchase as exempt (excluded) from Pennsylvania sales and/or use tax all tangible personal property within the definition of 'building machinery and equipment' as that term is defined in Act No. 45-1998. No charges for tax shall be allowed for such exempt items. It shall be the Contractor's responsibility to determine those items for which an exemption will apply, and the Contractor shall obtain legal or other tax advice to determine how and to what extent an exemption form the taxes apply. In order to facilitate such purchase free of sales and/or use tax in Pennsylvania, and upon certification by Contractor that an item is, in fact, tax exempt, the Owner agrees to execute a tax exemption certificate prepared by Contractor or a subcontractor as may be required by the regulations of the Pennsylvania Department of Revenue.

§ 3.6.2 The Contractor hereby accepts and assumes full and exclusive liability for payment of all sales taxes, state and municipal taxes including, without limitation, business privilege taxes, use taxes, and all contributions and payroll taxes under the provisions of Federal law or the laws of the Commonwealth of Pennsylvania, including, but not limited to, Social Security Acts, as to all employees engaged in the performance of the Work subject to this Agreement, and further agrees to meet all requirements that may be specified under regulations of government officials having jurisdiction over the Work. All such taxes are expressly included within the compensation owed to the Contractor under the terms of this Agreement. It is further agreed that the Owner shall have the right to deduct the amount of any and all such taxes from the compensation owed to the Contractor under the terms of this Agreement at any time, in the Owner's sole discretion, as the Owner deems advisable, it being agreed that the Owner shall have the right to deduct any and all such moneys from the next payments due under the Agreement and from the retained percentages.

§ 3.6.3 The Contractor hereby accepts and assumes full and exclusive liability for and shall indemnify, defend, protect, and save harmless the Architect, Construction Manager and Owner from and against the payment of:

.1 All contributions, taxes or premiums (including, without limitation, interest and penalties thereon) which may be payable under any unemployment insurance laws of any state, the Older Workers Benefit Protection Act of 1990 (OWBPA) (P.L. 101-433, October 16, 1990, 104 Stat. 978), as amended from time to time, the Federal Social Security Act, as amended from time to time, Federal, State, County and/or Municipal tax withholding laws, or any other laws, measured upon the payroll of or required to be withheld from employees, by whomever employed, engaged in the Work.

.2 All sales, use, personal property and other taxes (including, without limitation, interest and penalties thereon) required by any Federal, State, County, Municipal or any other laws to be paid or collected by the Contractor or any of its Subcontractors or vendors or any other person acting for, through or under it or any of them by reason of the performance of the Work or the acquisition, ownership, furnishing or use of any materials, equipment, supplies, labor, services or other items for or in connection with the Work.

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.3 All pension, welfare, vacation, annuity and other employee and union benefit contributions payable under or in connection with labor agreements with respect to all persons, by whomsoever employed, engaged in the Work.

.4 In the event that any law is or has been passed, or any rule or regulation pursuant thereof is enacted, which requires the Owner to pay, either directly or indirectly, the amount of any such sales, use, personal property and other taxes (including, without limitation, interest and penalties thereon) required by any Federal, State, County, Municipal or any other laws or should any such law, rule or regulation direct the Owner to collect the same, or make the Owner liable for the collection thereof, or make the Owner responsible therefor, it is covenanted and agreed that the Contractor shall fully and completely make all payments therefor, and shall fully and completely indemnify and save the Owner harmless from any and all such taxes.

§ 3.6.4 The Contractor shall base its Bid on the properly charged, collected, and remitted sales tax due on only those "construction activities" which are presumed to become a permanent part of the real estate in accordance with 61 Pa. Code Section 31.11, et seq., as amended from time to time. The Contractor has not included in its Bid any tax for "sales activities" which do not become a permanent part of the real estate in accordance with 61 Pa. Code Section 31.11, et seq., as amended from time to time.

§ 3.6.4.1 The Contractor shall preserve all such records for a period of three (3) years, or for such longer period as may be required by law, after final payment. To the extent requested by Owner, copies of such records will be provided by the Contractor, and the Contractor shall immediately transmit to the Owner copies of all invoices and receipts for materials, equipment, and labor furnished in connection with the Work by the Contractor and any other materials that reflect sales and use tax paid or not paid.

§ 3.6.4.2 The Contractor agrees to assign and transfer to the Owner all of its rights to sales and use tax which may be refunded as a result of a claim for refund for materials and/or equipment purchased for the Project. The Contractor further agrees that it will not file a claim for refund for any sales or use tax which is the subject of this assignment. This assignment will include, without limitation, any tax erroneously paid by the Contractor. Further, the Contractor agrees to execute all such documents as may be necessary to effectuate such an assignment.

§ 3.6.5 The Contractor shall keep detailed records of all materials, equipment, and labor furnished in connection with the Work and shall keep such full and detailed accounts as may be necessary for the proper financial management under this Agreement and the system utilized by the Contractor shall be satisfactory to the Owner. The Owner or its representative shall be afforded access to the Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, certifications, and similar data relating to this Agreement. Further, the Contractor must provide the Owner with certified payroll records in compliance with Section 16.3 for the labor furnished by the Contractor in connection with the Work. Contractor shall, at no additional charge to Owner, provide all necessary information and participate in any audits conducted on the Project, both during and after its completion, at the request of the Owner.

§ 3.6.5.1 Contractor shall require all of its Subcontractors to preserve and make their records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda, certifications, and similar data relating to the Work for a period of three (3) years, from the date of Final Completion or for such longer period as may be required by law, after final payment.

§ 3.7 Permits, Fees, Notices, and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Owner, assisted by the Construction Manager, shall assist with the completion of the application and pay for the building permit. The Contractor shall be responsible for final completion of the permit applications and coordinating the submission of the permit application. The Contractor shall secure and pay for all necessary administrative costs, insurances, business privilege licenses, certifications, or taxes to apply for the necessary permits required to perform the Work.

The Owner will pay any Sewer, Water, Gas and Electrical Utility Connection Charges.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. In any instance where requirements of the Contract Documents are in excess of but not in conflict with or violation of requirements of a public authority, the provisions of the Contract Document shall govern.

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§ 3.7.2.1 It is the responsibility of the Contractor to determine what codes and local ordinances, if any, will affect its Work. The Contractor shall check for any County, City, Borough, or Township rules or regulations applicable to the area in which the Project is being constructed and, in addition, the Contractor shall check for any rules or regulations of other organizations having jurisdiction, including, without limitation, chambers of commerce, planning commission, railroads, industries, or utility companies who have jurisdiction over lands which the Contractor furnishes materials, equipment and labor in connection with the Work. Any costs of compliance with local controls shall be included in the Contract Sum, even though documents of such local controlling agencies are not listed herein.

§ 3.7.2.2 The Contractor shall comply with all aspects of the Federal Occupational Safety and Health Act of 1970 (O.S.H.A.) including specific responsibilities to perform reporting and recording requirements. The Contractor is responsible to obtain information regarding his responsibilities under the Act.

§ 3.7.2.3 The Contractor shall comply with all aspects of Pennsylvania Act 287 (December 10, 1974), requiring among other things that each Contractor who intends to perform excavation or demolition work in a site within a political subdivision, ascertain the location and type of utility lines and pipes at each site and notifies the utility company(s) three (3) business days in advance of performing the excavation or demolition. Call Pennsylvania One Call System, Inc. (1-800-242-1776). The Contractor shall be responsible for timely notification to and coordination with all utility companies regarding the provision of services to the Project. The Contractor shall inform the Architect at once when the Owner's participation is required, and the Architect shall immediately notify the Owner. Connections for temporary and permanent utilities and payment for temporary utilities services required for the Work, whether the Work is new construction or renovation of an existing facility, are the responsibility of the Contractor unless otherwise agreed. If the Work is new construction, then payment for temporary and/or permanent utility services shall be the responsibility of the Contractor until Substantial Completion.

§ 3.7.2.4 The Contractor at all times shall observe and comply with all Federal and State Laws and local codes, ordinances and regulations in any manner affecting the conduct of work and all such orders or decrees as exist at present and those which may be enacted later by bodies or tribunals having jurisdiction or authority over the Work and shall indemnify, defend, and save harmless the Owner and all his officers, agents and servants against any claim or liability arising from or based on the violation of any such law, code, ordinance, regulations, order or decree, whether by himself or his employees.

§ 3.7.2.5 Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein and the Contract shall be read and enforced as though it were included herein, and if through mistake or otherwise such provision is not inserted, or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

§ 3.7.2.6 The Contractor shall ensure that products incorporated into, and used to execute, the Work of the Project are free from asbestos and other hazardous materials. If any suspected asbestos-containing material is installed, the Owner has the right to have the material in question tested and if proven to contain asbestos, the Contractor shall remove all material in question and replace it with new acceptable material at no additional cost to the Owner and shall pay for costs associated with testing of the suspected material.

§ 3.7.2.7 Material Shipments: The Contractor in making or ordering shipments shall not consign or have consigned materials, equipment, or any other items in the name of the Construction Manager, Architect, or the Owner. Neither the Construction Manager, Architect or the Owner shall be under any obligation to make payment for charges on shipments made by or to the Contractor.

§ 3.7.3 It shall be the obligation of the Contractor to review the Contract Documents and to determine and to notify the Owner, the Architect, and the Construction Manager of any conflict, inconsistency, or discrepancy between standards, codes, laws, ordinances, building codes and regulations of which the Contractor has knowledge or should be reasonably able to determine. The Contractor shall not violate any zoning, setback or other requirements of applicable laws, codes, standards, regulations and/or ordinances, or of any recorded covenants of which the Contractor has knowledge. If the Contractor observes that portions of the Contract Documents are at variance with applicable laws, statutes, ordinances, building codes, standards, codes, rules or regulations, the Contractor shall notify the Architect and Construction Manager promptly in writing, and necessary changes shall be accomplished by appropriate modification.

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§ 3.7.3.1 If the Contractor, any of its Subcontractors or any Sub-Subcontractors, performs Work contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Construction Manager, Architect, and Owner, the Contractor shall assume full responsibility for such Work and shall bear the attributable costs, including but not limited, any fines or penalties from governmental authorities and the costs of corrective actions or replacement.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall contemporaneously provide notice to the Owner, Construction Manager, and the Architect before conditions are disturbed and in no event later than 14 calendar days after first observance of the conditions. The Architect and Construction Manager will promptly investigate such conditions and, if the Architect, in consultation with the Construction Manager, determines that conditions differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect, in consultation with the Construction Manager, determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner, Construction Manager, and Contractor, stating the reasons. Claims by the Contractor in opposition to such determination must be made within 21 calendar days after the Architect has given notice of the decision. If the Owner or Contractor disputes the Architect's determination or recommendation, either party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner, Construction Manager, and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Time arising from the existence of such remains or features may be made as provided in Article 15. If Contractor notifies the Owner, Construction Manager, and/or Architect of any of the conditions set forth in this Section, Owner shall have the right, in such event, to terminate the Agreement, and upon payment to Contractor of all sums due as of the date of termination, Owner shall have no further liability or responsibility to Contractor under the Contract Documents.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents:

- **.1** allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- **.2** Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- **.3** whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.8.4 NO CASH ALLOWANCES are included in the Contract Documents for any purpose.

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§ 3.9 Superintendent and Project Manager

§ 3.9.1 The Contractor shall employ a competent superintendent, Project Manager and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent and Project Manager shall represent the Contractor, and communications given to the superintendent or Project Manager shall be as binding as if given to the Contractor. At the request of the Construction Manager, Architect or Owner, the Contractor's superintendent and Project Manager shall attend Project meetings, whether the Project meetings are prior to the start of the Contractor's work or subsequent to the completion of the Contractor's work. The Superintendent shall be on the Project site full time during the progress of the Work until the day of substantial completion and for such additional time thereafter as the Construction Manager may determine to be necessary for the expeditious completion of Work. Communications shall be promptly confirmed in writing.

§ 3.9.2 Each Contractor, within ten (10) business days following receipt of Notice to Proceed, shall furnish in writing to the Owner and Architect, through the Construction Manager, of the name and qualifications of a proposed superintendent and Project Manager. The proposed personnel shall include at least 3 recent projects of similar contract size and scope, with the names and telephone numbers of Owner and Architect representatives. Within 14 calendar days of receipt of the information, the Construction Manager may notify the Contractor, stating whether the Owner, the Construction Manager, or the Architect (1) has reasonable objection to the proposed superintendent or Project Manager, or (2) require additional time for review. Failure of the Construction Manager to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.2.1 The Contractor is to appoint a single representative for both the Superintendent and Project Manager who will be assigned on-site and will designate the same in writing, who has the authority to act on behalf of the Contractor and its Subcontractors and suppliers. Contractor's supervision of Work shall include expediting and coordination of work of trades. Contractor shall perform all supervising and procuring required to ensure delivery of materials to maintain work schedules of sub-contractors and progress schedule of Project to ensure full completion of work, to supply equipment or instruments necessary to complete specified test, checks, balancing of system, to furnish operating instructions, etc.

§ 3.9.2.2 As a consideration of the Contract between the Owner and the Contractor, the Contractor shall retain the same Superintendent and Project Manager for its Work on the Project while on the Project. The Superintendent or Project Manager shall not be reassigned from this Project prior to completion, unless by termination of employment by the Superintendent, Project Manager, or the Contractor, or if required by the Construction Manager or by the Owner in accordance with Section 3.9.3.

§ 3.9.2.3 Contractor's supervision of Work shall include expediting and coordination of Work of trades. Contractor shall perform all supervising and procuring required to ensure delivery of materials to maintain Work schedules of Subcontractors and progress schedule of project to ensure full completion of Work, to supply equipment or instruments necessary to complete specified test, checks, balancing of system, to furnish operating instructions, etc. The outlined work is to be completed in the timeframe set forth in the original project schedule shared with the bidding contractors.

§ 3.9.2.4 Superintendent Timing

Requirements for submission of superintendent and Project Manager information are administrative in nature. The requirement for on site presence of the Superintendent and Project Manager shall apply from the commencement of the Work unless otherwise directed in writing by the Construction Manager.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner, Construction Manager, or Architect has made reasonable and timely objection. The Superintendent shall be on site full-time from the initial date as directed by the Construction Manager, which can be reasonably considered the time that Work is commencing onsite. The Contractor shall not change the superintendent without the Owner's and Construction Manager's consent, unless the superintendent proves to be unsatisfactory to the Contractor and ceases to be in the Contractor's employ. If any Contractor should at any time fail to provide adequate supervision and superintendence, as may be evidenced by incomplete, delayed or non-conforming Work, the Owner may provide supervision and superintendence and the cost thereof, including, but not limited to, compensation for additional professional services, legal fees, or other costs or expenses incurred, shall be charged to the applicable Contractor in the form of a Change Order incorporating an appropriate reduction in the Contract Sum. If the payments due to the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner. The Owner and/or Construction Manager shall have the

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right to dismiss from the Project any superintendent whose performance is not satisfactory in the sole discretion of the Owner. If during the course of the Project it is evident that the Superintendent is not competent or is not managing the progress of the Project or is not coordinating the various trades, entities, and/or persons under his supervision, then the Construction Manager will document such findings to the Contractor. If within 10 business days of receiving such notice, no substantial effort or correction of the finding is made known to the Construction Manager, then the Construction Manager, as requested by the Owner, may require the immediate replacement of the superintendent with an acceptable one at no additional cost to the Owner. The Owner reserves the right to deduct $800.00 per day from the Contract Sum, as liquidated damages and not as a penalty, for each day that a qualified superintendent is not on site for the entire day.

§ 3.9.4 At any time during the Project, the Owner, Architect, and Construction Manager shall have the right and authority, but not the duty, to require the replacement of the Contractor's Project Manager, Superintendent, or Foreman. The Construction Manager shall have the right and authority, but not the duty, to require the Contractor to assign additional supervisory personnel to the Project to ensure compliance with the schedule and quality requirements at no additional cost to the Owner and no increase in the Contract Sum. The Contractor shall not change or replace the assigned superintendent or Project Manager without the prior written consent of the Owner. The proposed replacement superintendent or Project Manager is subject to review pursuant to the process outlined in § 3.9.2 prior to acceptance by the Owner and Architect.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall cooperate with the Project Coordinator and prepare and submit for the Architect's information, and the Owner's and Construction Manager's approval, a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. The schedule shall be revised monthly to reflect the conditions of the Work and Project. The Contractor shall cooperate with the Construction Manager and Project Coordinator in scheduling and performing the Contractor's Work to avoid conflict with, and as to cause no delay in, the work or activities of other Multiple Prime Contractors, or the construction or operations of the Owner's own forces or Separate Contractors.

.1 The Contractor's failure to cooperate and participate with the Owner, the Construction Manager, other Prime Contractors and separate contractors in the development and review of construction schedules as provided in this Section 3.10 and Specification Section 01 32 00, Construction Progress Documentation, shall be a material breach of its obligations, entitling the Owner to exercise all rights and remedies under the Contract Documents and applicable law. In no event shall any revision to any construction schedule constitute the basis for an adjustment in the Contract Time or the Contract Sum unless such adjustment is agreed to by the Owner and authorized pursuant to Change Order. **Failure of Contractor to fully comply with requirements of this Section 3.10, and the other Contract Documents regarding scheduling shall constitute default by Contractor of its obligations and be sufficient grounds for termination of the Contract.**

.2 The schedules prepared by the Contractor and by the Project Coordinator, if any, under this Article shall be in the form of a CPM arrow network diagram, preferably organized by predecessor and successors and shall include:

- **a.** A shop drawing and submittal schedule noting the relevant submittal, approval, order, fabrication and delivery durations.
- **b.** Integration of the shop drawing and submittal schedule with the installation activity logic in order to determine the effect of delivery on installation of any items of Work.
- **c.** The planned progressions of construction work showing the activities and duration of the Work of each contract phase and clearly noting any interim milestone dates.
- **d.** The appropriate restraints in order to clearly identify the interrelationships of work and crew and trade flow.
- **e.** Logic (CPM arrow network) diagrams summarized into a summary bar chart format that is capable of displaying current progress of all Work.

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f. A computerized mathematical analysis of the CPM logic with each monthly schedule responsibility, activity duration, early (target) start date, early (target) finish date, late start date, late finish date, work tasks critical to completion within the Contract Time, and any interim milestone dates.

g. Crew sizes and planned labor hours for each activity shown on the schedule. Such schedules shall be produced using scheduling software or such other project management program. The Contractor shall deliver to the Owner, upon Owner's request and in the format requested by the Owner, copies of all electronic files (including all schedule logic, restraints and all other electronic data and information used to create and maintain the schedule that the Owner may request) that comprise or relate to such schedules, including the original Project schedule, all schedule updates, any recovery schedules, and any schedule revisions.

.3 The Project Schedule shall be submitted by the Contractor for all Work. All schedule and work items must be in conformance with the Project schedule requirements set forth in the Contract Documents including any phasing or other milestones provided. The Project Coordinator shall incorporate all Contractors' items of Work and issue the Project schedule. Upon written approval of the Project schedule by the Owner and Construction Manager, it shall with respect to time, become the essence of the Contract. The Project schedule may be changed or revised only with the written consent of the Construction Manager and Owner. No payment applications will be processed without an approved Project schedule accepted by all Prime Contractors.

.4 The Project Schedule is to be used by the Prime Contractors as a guide, and all Contractors and Sub-contractors shall be responsible to perform Work to ensure that the Project is completed by the Project Contract completion date(s), and all phasing and milestone dates established in the Contract Documents are met. Any claims for additional costs associated with completion of the Work within the required Contract time frames will not be considered. The Contractor and all Sub-contractors, who feel extra time, in any form such as shift work, overtime, and premium time, is necessary to meet Contract requirements regardless of trade, should include these costs in their Bids. All Prime Contractors must recognize that although their Work might not require shift, overtime, or premium timework for completion within the stipulated time frame, it may be required in order to allow other Contractors to complete within the time frame. Prime Contractors must allow for these overtime requirements and include the costs necessary to allow the other contractors to complete within the specified time. Failure to recognize the extra costs in his Bid shall not relieve the Prime Contractor from utilizing shift, overtime, or premium time work in performance of his Contract, and all costs associated with meeting the time frames indicated in the construction schedules shall be included in the Contract Sum. Construction Manager, Architect, and Owner reserve the right to withhold processing of any monthly payment applications from Prime Contractor if schedule compliance is not being strictly adhered to. Such payment may be withheld until the Prime Contractor makes corrective action to comply with Project schedule.

.5 Any preparation, review, enforcement, and updating of the Project schedule does not make Owner, Construction Manager or Architect liable to Contractor for time, cost overruns, or schedule changes which are required to maintain Project Contract completion date and all phasing and milestone dates established in the Contract Documents.

.6 General Scheduling Requirements: Any of the scheduling requirements, including the format, content, and complexity, can be waived, or modified by the sole discretion of the Construction Manager only. Any modification or waiver by the Construction Manager shall not be grounds for any claim by Contractor against Owner, Construction Manager, or Architect. Project Coordinator shall submit final construction schedule and all schedule updates in electronic format with no restrictions for viewing and analyzing using the same software with which the schedule was created. Electronic format shall be submitted to the Construction Manager and to any Contractor that Construction Manager may direct.

.7 The Work under the Contract Documents shall be planned, scheduled, executed, reported, and accomplished using the cost and resource loaded "Critical Path Method" schedule, in calendar days (excluding Saturdays, Sundays and legal holidays). The provisions of the Division 01 General Requirements, and the directions of the Project Coordinator are to be followed by the Contractor in scheduling and coordinating construction activities. The scheduling services of the Project Coordinator are part of its contract with the Owner, but nothing herein relieves the obligations of the Contractor to schedule their own construction activities, and nothing herein alters the obligation of the Contractor to resolve all supervision, coordination, and scheduling issues between and among the

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Sub-Contractors. In addition, the requirements for subordinate coordination responsibilities and scheduling per the Division 01 General Requirements must be followed by all Prime Contractors.

.8 Contractor is responsible for determining the sequence and logic of activities, the time estimates of the detailed construction activities and the means, methods, techniques, and procedures to be employed with regard to his portion of the Work. The construction schedule shall represent Contractor's best judgment of how he shall prosecute the Work in compliance with the requirements of the Contract Documents. Contractor shall ensure that the construction schedule is current and accurate and is properly and timely monitored, updated, and revised as Project conditions and the Contract Documents may require, and as may be directed by Project Coordinator.

.9 Contractor shall consult with his major Subcontractors relating to the preparation of his construction plan and construction schedule. Major Subcontractors shall receive copies of those portions of Contractor's construction schedule that relates to their Work and shall be continually advised of any updates or revisions to the construction schedule as the Work progresses. When Contractor submits his construction schedule to the Project Coordinator or makes any proposed updates or revisions to such schedule, it shall be concluded by Construction Manager, Owner, and Project Coordinator that Contractor has consulted with and has the concurrence of his major Subcontractors. Contractor shall be solely responsible for ensuring that all Subcontractors comply with the requirements of the construction schedule for their portions of the Work.

.10 Contractor shall provide the basic data as required by Project Coordinator relating to activities, durations, costs, and sequences as part of Contractor's draft of the Construction Schedule. This data shall reflect Contractor's actual construction plan for the Project and shall fully comply with all requirements of the Contract Documents.

.11 Contractor acknowledges and agrees that his construction schedule must be flexible in order to accommodate and allow for his coordination with all the construction activities and Work of other Prime Contractors, Owner's own forces, and other separate contractors.

.12 Review of the Contractor's construction schedule or any other schedule or plan of construction by the Construction Manager, Owner, or Project Coordinator is solely for informational and coordination purposes. Such review shall not constitute approval of, or agreement to, any activity sequence, duration, start date, or finish date shown therein. Nothing in such review shall be deemed to modify the Contract Documents, relieve the Contractor of responsibility for planning and sequencing the Work, or excuse the Contractor from completing the Work in accordance with all milestone, phase, and completion dates set forth in the Contract Documents.

.13 The completion, phasing, and milestone dates set forth in the Contract Documents represent only the major items of Work and may include interface dates with the construction activities of others. Completion, phasing, and milestone dates are Contract requirements and are of the essence to the Contract Documents and to the coordination of the Work by the Contractor. Completion, phasing, and milestone dates represent the latest allowable completion time for those portions of the Work to which each date relates. The dates are not intended to be a complete listing of all Work under the Contract Documents or of all interfaces with Work performed by the Contractors or others. The Contractor shall determine the time requirements for all such interfaces and shall be responsible for planning, scheduling, and coordinating the Work in order to complete in accordance with those requirements.

.14 Review by the Project Coordinator or Construction Manager of Contractor's Construction Schedule, or any revisions or updates thereto, are advisory only and shall not relieve Contractor of the responsibility for accomplishing each portion of the Work within each and every applicable Completion Date. Omissions and errors in the approved or accepted Construction Schedule, or any revisions or updates shall not excuse performance, which is not in compliance with the Contract Documents. Review by the Project Coordinator does not make Owner, Project Coordinator, Construction Manager, or Architect liable to Contractor for time or cost overruns flowing from such omissions or errors.

.15 Should Contractor intend or plan to complete the Work, or any portion thereof, earlier than any applicable completion, phasing, or milestone date or the Contract Time, Contractor shall give timely and reasonable written notice of this fact to the other Prime Contractors, Project Coordinator, and Construction Manager. Project Coordinator shall have the discretion to agree to or reject such early completion plan by Contractor, subject to the rights of Contractor to dispute resolution under the provisions of Article 6 of these General Conditions. The Project Coordinator shall have no duty or obligation to agree to, or to cooperate with Contractor regarding any early completion plan or proposal by Contractor and shall not be liable for any damages of Contractor because of the rejection by Project

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Coordinator of said plan. Earlier completion of any portion of the Work shall be promoted wherever feasible, and all Contractors must cooperate and accelerate towards earlier completion of any portion of the Work unless such Work affects the quality of work as determined by the Construction Manager. No claims for acceleration to complete early or to meet Project schedule will be considered.

.16 In all respects, Project Coordinator shall cooperate with the Construction Manager in the performance of all duties described in the Contract Documents.

.17 At Construction Manager's sole discretion, if Contractor fails to fulfill their construction scheduling responsibilities in part or in whole, scheduling services may be provided by Construction Manager. Any scheduling services of the Construction Manager actually provided will result in deductions from the Contract Sum of the respective Prime Contractors by Change Order deduct so that the Construction Manager is fully reimbursed for this work, but nothing herein relieves the obligations of the Project Coordinator and other Prime Contractors to schedule and coordinate their own construction activities.

- **a.** The preliminary Project schedule must be completed within 10 business days of Notice to Proceed.
- **b.** The final Project schedule must be completed within 20 business days of approval of Preliminary Project schedule.
- **c.** Comply with requirements of Section 01 32 00 "Construction Progress Documentation".

.18 If the Contractor does not comply with all the scheduling requirements and timelines, the Owner, upon recommendation from the Construction Manager, reserves the right to deduct as liquidated damages, and not as a penalty, $800.00 from the Contract Sum for each day that Contractor does not comply. The Owner may also proceed with enforcing other requirements of the Contract Documents.

.19 Any measures so required or undertaken by the Contractor to maintain the Construction Schedule and to comply with related Section 01 32 00, "Construction Progress Documentation," shall be provided by the Contractor at no additional cost to the Owner.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Construction Manager's and Architect's review. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Construction Manager and Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor cooperates, participates, and consults with other Prime Contractors during the Work of this Project. The Contractor shall make revisions to the construction schedule and submittal schedule as deemed necessary by the Construction Manager to conform to the Project schedule. The Contractor shall schedule and execute their Work to avoid delay to other Prime Contractors, the Owner's own forces, or other separate contractors. The Contractor shall be financially responsible for undue delay they cause to other Prime Contractors, Owner, and separate contractors on the Project. The Contractor shall defend and hold harmless the Owner, Construction Manager, and Architect for any claims, losses or delays of any kind whatsoever made by other Prime Contractors or separate contractors arising from delays caused by the Contractor.

§ 3.10.4 The Contractor shall promptly perform the Work in accordance with the most recent schedules submitted to the Owner, Construction Manager, and Architect, and incorporated into the approved Project schedule and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall bear all costs and expenses for its delay in failing to meet schedules and milestones for the Project.

§ 3.10.5 The Owner shall have the right to direct a postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operations of other contractors or of the Owner's premises or any of the Owner's operations. The Contractor shall, upon the Owner's request, schedule any portion of the Work affecting other contractors or the operation of the premises during hours when the premises are not in operation. Any postponement, rescheduling, or performance of the Work under this Section 3.10.5 may be grounds for an extension of the Contract Time, if permitted under Section 8.3, but not an increase in the Contract Sum.

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§ 3.10.6 Progress payments to the Contractor shall not occur until the Contractor has met the requirements of schedule information stated in this Section 3.10 and the Contract Documents.

§ 3.11 Documents and Samples at the Site

§ 3.11.1 The Contractor shall maintain and make available, at the Project site, one copy of the Contract Documents, including Drawings, Specifications, and Addenda, Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Construction Manager, Architect, and Owner, and delivered to the Construction Manager for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.11.2 The Contractor shall also update the Construction Manager's record set of drawings on a weekly basis, at a minimum, and more frequently as necessitated by the Work. Upon completion of the Work, Contractor shall certify that such record drawings accurately reflect all "as built" conditions for which the Contractor is responsible, after which the Construction Manager will deliver its record drawings to the Architect for submittal to the Owner .

§ 3.12 Shop Drawings, Product Data, and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect and Construction Manager is subject to the limitations of Sections 4.2.10 through 4.2.12. Informational submittals upon which the Construction Manager and Architect are not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Construction Manager or Architect without action. Shop drawings submitted prior to issuance of the building permit solely at the Contractor's risk.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Construction Manager, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the Project submittal schedule approved by the Construction Manager and Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of other Contractors, Separate Contractors, or the Owner's own forces. The Contractor shall cooperate with the Construction Manager in the coordination of the Contractor's Shop Drawings, Product Data, Samples, and similar submittals with related documents submitted by other Prime Contractors.

§ 3.12.5.1 Except where otherwise specified or agreed by Architect, the Contractor shall submit all shop drawings, product data, samples, and similar submittals within ninety (90) calendar days of the Notice to Proceed. When such initial submittals are rejected or otherwise required to be corrected and resubmitted, Contractor shall transmit complying submittals promptly so as to avoid delay in the Work, and in any case within thirty (30) calendar days after return of the initial submittal, unless otherwise agreed by the Architect. Notwithstanding these time requirements for submittals, submittals that are required for work on the critical path of the construction schedule shall be submitted earlier and in a timely manner so as not to delay the Work.

§ 3.12.5.2 The Contractor agrees that the Owner will be damaged in an undeterminable amount if submission of shop drawings, product data, samples, and similar submittals is not made in compliance with Section 3.12.5.1.

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§ 3.12.5.3 The Owner reserves the right to deduct $800 per day, as liquidated damages, and not as a penalty, until all such required submittals have been respectively and accordingly transmitted.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Construction Manager, and Architect, that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and approved by the Architect. Further, Contractor shall not be entitled to additional costs or time in the event that Contractor orders products or materials prior to receipt of review and approval of the submittal therefor, and which submittal is subsequently rejected or modified by Architect.

§ 3.12.8 The Work shall be in accordance with reviewed/accepted submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's review/acceptance of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Construction Manager and Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's review/acceptance thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Construction Manager and Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. Where applicable law and/or the Contract Documents require that Contractor engage a licensed design professional to provide a service, Contractor shall employ a professional possessing the required license in order to perform the service required.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner, the Architect, and the Construction Manager shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and accept or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Construction Manager and Architect at the time and in the form specified by the Architect.

§ 3.12.11 Shop drawings, product data, and samples shall be submitted in quantity and procedures as directed by the Architect. It shall be the responsibility of each Prime Contractor to prepare and furnish to other Prime Contractors

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engaged on the Project, copies of shop drawings as may be required by such other Prime Contractors for the proper installation of their Work. Failure of the Contractor to furnish such information will make him responsible for any other expenses incurred in carrying out the provisions of such other Prime Contracts.

§ 3.12.12 Under no circumstances shall the Construction Manager, Architect, or Engineer's review of any shop drawing be construed as an approval of extra cost to the Owner for any work shown thereon. Any claim for extra cost shall be made as specified before the time of submitting shop drawings.

§ 3.12.13 All expenses incurred in delivering, transporting, packing, collecting, etc., of samples of materials or equipment shall be paid for by the Contractor, whether samples be delivered to the Project site, to the Architect, or to the laboratory. The cost of mill, fabrication, shop testing, or factory testing and inspection of all material required to be furnished under this Contract shall be borne by the Contractor. Any sample destroyed in the course of testing cannot be returned to the Contractor. Certain approved material, such as hardware, valves, fittings, fire alarm signals, in good condition and not subject to destructive tests, may be used in the Work by the Contractor. This material shall be the last of its particular kind to be incorporated in the building and may not be removed from the Architect's office until just previous to its use. Any material delivered to the job will be compared with the approved sample on file in the Architect's office and if necessary, an additional test shall be made on this material at the cost of the Contractor. Additionally, if a Contractor's shop drawing or other submittal requiring approval of the Architect requires review by the Architect more than three times, then the Contractor shall be responsible to the Owner and the Architect for any costs or expenses associated with reviews beyond the third review.

§ 3.12.14 To better facilitate the shop drawings process, copies of Floor Plan Backgrounds will be made available in electronic format to all Prime Contractors subject to the following provisions:

.1 The Contractor shall execute and submit the release and indemnification provided and requested by the Architect, Construction Manager, or Consultants. Form is included as Specification Section 01 31 26, Electronic Communication Protocols.

.2 The data contained in any and all electronic files is copyright protected by the Architect and shall be used solely for the facilitation of the shop drawing process on this Project only. Any other use that is not consistent with this intended use is strictly prohibited. Any misuse will be punishable to the fullest extent of the law.

.3 Electronic media will only be made available to Prime Contractors. Direct requests from Subcontractors will not be honored. Prime Contractors shall bear the responsibility of distribution to their Subcontractors, if desired. Requests shall be made in writing directly to the Architect and shall indicate the list of drawings requested (indicate by drawing number). Drawings will be provided in .dwg format and issued electronically.

.4 The Prime Contractor shall thoroughly check all information and details of the Drawings and be satisfied that all information and details are correct. Information concerning existing conditions, if applicable, shall be thoroughly field checked and verified. Incorrect information and details shall immediately be called to the attention of the Architect. Please note that Addenda information will not be included on the electronic files. The Prime Contractor shall be responsible for incorporating all pertinent Addenda information.

.5 The Owner, the Construction Manager, the Architect, and the Architect's Consultants shall not be held responsible for any costs or other liabilities resulting from the use of electronic files or the failure of the Prime Contractor to detect errors and omissions concerning matters within his contractual responsibility through the use of said electronic files. The Prime Contractor shall indemnify, defend, and hold harmless, to the fullest extent permitted by law, the Owner, the Construction Manager, the Architect, and the Architect's Consultants, their directors, officers, agents, and employees from and against any and all claims, damages, losses and expenses, including attorney's fees arising out of the modification, misinterpretation, misuse of the electronic files, and for any and all errors or omissions alleged to have arisen out of the use of any electronic files.

.6 Nothing herein contained shall be construed as constituting a guarantee, warranty, or assurance, either expressed or implied, by any party, that the electronic files will yield or accomplish the Prime Contractor's desired outcome.

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§ 3.13 Use and Protection of Site

§ 3.13.1 The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.1.1 If requested by Owner or Construction Manager, Contractor shall move materials from one temporary location shown on the Contract Documents to another, at the sole expense of Contractor, except that expense shall be borne by Owner when Owner requires that materials be moved from a location on the Contract Documents previously assigned to Contractor by Owner. No advertising signs or flags of any nature shall be placed at or near the site, without the written consent of Owner. Owner may make use of any portions of the Work for which a Certificate of Substantial Completion has been accepted in writing by Owner and Contractor.

§ 3.13.2 The Contractor shall coordinate the Contractor's operations with, and secure the approval of, the Construction Manager before using any portion of the site. The Work shall be conducted so as not to impede traffic nor obstruct any thoroughfare or access to property, and so as not to interfere with the Work of other contractors or with the Owner's continued occupancy and operation of the property. All deliveries shall be coordinated around hours directed by the Owner.

§ 3.13.3 Only materials and equipment which are to be used directly in the Work may be brought to and stored on the Project site by the Contractor. Materials or equipment no longer required for the Work shall be promptly removed from the Project site. Protection of construction materials and equipment stored at the Project site from weather, theft, damage or all other adversity is solely the responsibility of the Contractor, and the Owner shall have no liability therefore.

§ 3.13.4 During the progress of the Work, the Contractor shall provide lights, barriers, warning signs or other prudent precautions as may be necessary to protect persons and property from the Work performed by the Contractor.

§ 3.13.5 The Contractor shall protect the Owner's property, all surrounding public and private properties, the Contractor's Work in place, and all the Work of separate contractors of other Prime Contractors against damage, injury or loss arising in connection with the Contractor's Work.

§ 3.13.6 The Contractor shall, at all times, provide adequate protection of the Work against all kinds of weather so as to maintain all Work, apparatus and fixtures free from injury or damage. At the end of each day's work, all new work subject to potential damage shall be completely covered.

§ 3.13.7 The Contractor shall maintain all passageways, guard fences, lights, fire watch, and other facilities for protection necessary for compliance with applicable laws or otherwise required by authorities have jurisdiction.

§ 3.13.8 To the extent the Contractor is responsible for damage to any existing improvements or vegetation, including, without limitation, curbs, sewers, utilities, sidewalks, drainpipes, structures, lawns, shrubbery, trees, landscaping, hardscaping or other improvements at the site, the Contractor shall repair, restore or replace such damaged improvements or vegetation to the Owner's reasonable satisfaction.

§ 3.13.9 In case any direct or indirect injury is done to existing street or underground structure, sewers, mains, or to public or private property of any kind, or to any materials or fixtures, by or because of the Work in consequence of any act or omission on the part of the Contractor, his employees, or agents, the Contractor, at his own cost and expense, except where, hereinafter specified otherwise, shall restore such structures, property, or materials to a condition equal to or similar to the existing before such damage or injury was done, by repairing, rebuilding, or otherwise as may be required by the Architect. To the extent that the Contractor fails or refuses to meet the requirements of this Section and such failure and/or refusal results in the Owner incurring additional attorney's fees, professional fees, other costs or expense, the Contractor shall be liable for the same.

§ 3.13.10 If the Contractor fails to restore such property or make good such damage, the Owner may, by contract or otherwise, proceed to repair, rebuild, or otherwise restore such property as may be necessary, and the cost thereof will be deducted from any money due, or to become due, the Contractor under this Contract; or the Owner may deduct from any money due the Contractor a sum sufficient to reimburse the Owner of property so damaged.

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§ 3.13.11 When the Contractor is working within a fully enclosed building with either temporary or permanent doors, the Contractor shall suitably lock the building to prevent access of unauthorized persons.

§ 3.13.12 All temporary shoring, bracing and sheet piling necessary for the underpinning and for the installation of new Work are included in the Contract Sum and shall be used in accordance with industry standards.

§ 3.13.13 Employees of the Contractor and is Subcontractors shall not park automobiles on the Owner's property except as approved by the Owner in writing or otherwise designated in the Drawings. Contractor shall direct and require all its employees and Subcontractors' employees to park where required by the Contract Documents and the municipal authority.

§ 3.13.14 The Contractor's use of and operations on the site shall not interfere with the Owner's continued operation. The Contractors shall take care to exercise and use processes that avoid any impact on the Owner's ongoing operations.

§ 3.13.15 The equipment and procedures used on portions of the Work shall be such that no damage to adjacent property or roadways will result from their use. No work of any kind shall be installed or stored in a manner which will endanger the structure of the building.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner, Separate Contractors, or of other Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner, Separate Contractors, or by other Prime Contractors except with written consent of the Construction Manager, Owner, and such other Contractors or Prime Contractors. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Separate Contractors, Prime Contractors, Construction Manager, or the Owner, its consent to cutting or otherwise altering the Work.

§ 3.14.3 The Contractor, Subcontractor or Sub Subcontractor requiring the cutting of openings in new work installed by other contractors shall have such openings cut and patched by the trade which installed the Work and such cutting and patching shall be at the expense of the Contractor, Subcontractor or Sub Subcontractor requiring the opening. Approval to do such cutting and patching shall be received from the Construction Manager and the Architect prior to proceeding with the Work and shall include installation of such reinforcement of the Work as the Architect and the Construction Manager may direct at no additional cost to the Owner. Blocking, bracing, reinforcement, or structural enhancement required, due to cutting and patching, shall be provided at no additional cost to the Owner. Patching work shall match adjacent existing work unless otherwise noted.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project. The Contractor shall clean the Work areas daily and should the occasion arise that the Construction Manager must direct the Contractor to clean an area, the Contractor shall do so within twenty-four (24) hours. In the event of a dispute between or among the Prime Contractors regarding responsibilities for cleaning up, the Construction Manager shall designate the relative responsibilities, and such designation shall be final and binding.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner, or Construction Manager with the Owner's approval, may do so and the Owner shall be entitled to reimbursement from the Contractor. The Owner reserves the right to deduct $800.00 per day from the Contract Sum, as liquidated damages and not as a penalty, for each day that Contractor fails to comply with Construction Manager's directions for required clean-up.

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§ 3.16 Access to Work

§ 3.16.1 The Contractor shall provide the Owner, Construction Manager, and Architect with access to the Work in preparation and progress wherever located.

§ 3.16.2 The General Contractor shall perform snow plowing, cleanup, and provide all temporary facilities to keep the site accessible at all times and to permit the continuous progress of work by all Contractors.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner, Construction Manager, and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner, Architect, or Construction Manager. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect through the Construction Manager.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, and to the extent claims, damages, losses, or expenses are not covered by insurance supplied by the Owner, the Contractor shall indemnify, defend and hold harmless the Owner, Construction Manager, Architect, and their officers, directors, consultants, agents, and employees (the "Indemnified Parties" from and against all claims, damages, losses, and expenses, including but not limited to injuries to the Contractor's employees, legal fees, and defense costs arising out of or resulting from the performance of the Work, to the extent caused, in whole or in part, by the negligent, intentional or wrongful acts or omissions of the Contractor, a Subcontractor, a sub-subcontractor or material provider, anyone directly or indirectly employed by them, or anyone for whose acts or omissions they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by the Indemnified Parties or any of them. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18. The Contractor agrees and does hereby assume on behalf of the Indemnified Parties the defense of any action, at law or in equity, which may be brought against the Indemnified Parties or any of them upon their demand and pay the amount of any judgment that may be entered against the Indemnified Parties in any such action. In the event that any such claim, loss, cost, expense, liability, damage or injury arises or is made, asserted or threatened against the Owner for which the Contractor or its insured does not admit coverage, or if the Owner reasonably determines such coverage to be inadequate, the Owner shall have the right to withhold from Contractor cost, expense, liability, damage or injury including, but limited to, legal fees and expenses reasonably necessary for the defense thereof. Contractor's obligations under this Section 3.18 shall survive the completion of the Work and Project.

§ 3.18.2 In claims against any Indemnified Party under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the indemnification obligation under this Section 3.18 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts or any immunity provided under any workers' compensation acts.

§ 3.18.2.1 The Contractor and each Subcontractor, of whatever tier, hereby certifies to the Owner that it complies with all employment related laws and regulations governing employment or collective bargaining agreements, if any. Nothing in this Agreement shall be construed as divesting any Contractor of Subcontractor of its sole and exclusive right to control the means, manner, or method of performance of the Work of any Contractor of their employees. Nothing in this Agreement shall be construed in a manner that would be violative of the legal or contractual rights of any employee. The Contractor, and each Subcontractor, regardless of tier, shall defend, hold harmless, and indemnify the Owner, Construction Manager, and Architect against and from any and all claims, demands, suits, actions, costs, and expenses including reasonable attorneys' fees, growing out of any claims by an employee or independent contractor of any Contractor or Subcontractor of any tier alleging the violation of any of the individuals' employment right, whether legal, constitutional or contractual in nature. This provision shall be accorded the broadest meaning permitted by law.

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§ 3.18.3 Each Contractor shall indemnify, defend, and hold harmless the Owner against any assertion of claims and/or liens, including mechanic's liens by its Subcontractors, Sub-Subcontractors, or material suppliers and against any assertion of security interests by its suppliers of goods or materials. Each Contractor and each Subcontractor and supplier of any tier acknowledges that the Project is work for a purely public purpose; therefore, Pennsylvania law does not permit mechanics' liens to be filed against the Owner, the Property, the Project, or any portion thereof.

§ 3.18.4 No provision of Section 3.18 shall give rise to any duties on the part of the Architect, the Owner or the Construction Manager not otherwise provided for by law.

§ 3.18.5 In the event that Contractor or its insurer is requested but refuses to honor the defense and indemnity obligations hereunder, then the party refusing to honor such requests shall, in addition to all other obligations, pay the cost of bringing any such action, including, but not limited to, legal fees to the Indemnified Party, including, but not limited to, any legal, expert, or professional fees and costs incurred by the Indemnified Parties in enforcing the defense and indemnity obligations hereunder. Furthermore, the Contractor shall be solely responsible for all legal fees incurred by the Owner in responding to any claims or liens filed or asserted by a Subcontractor of any tier or a supplier of any tier.

§ 3.18.6 Any part of the Work which may cause contamination or pollution to the environment shall be performed by subcontractors who are properly certified to do such work and who normally carry contractually assumed indemnification insurance and public liability insurance to cover such Work in the amount required to be carried by Contractor for liability and contractually assumed liability coverage under this Contract.

§ 3.19 Representations and Warranties

§ 3.19.1 The Contractor represents and warrants the following to the Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute the Owner Contractor Agreement, which representations and warranties shall survive the execution and delivery of the Owner Contractor Agreement and the Final Completion of the Work:

.1 that it is financially solvent, able to pay its debts as they mature and possesses sufficient working capital to complete the Work and perform its obligations under the Contract Documents.

.2 that it is able to furnish the personnel, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder and has sufficient experience and competence to do so.

.3 that it is authorized to do business in the Commonwealth of Pennsylvania and is properly licensed by all necessary governmental and public and quasi public authorities having jurisdiction over it and over the Work for the Project.

.4 that its execution of the Owner Contractor Agreement and its performance thereof is within its duly authorized powers.

.5 that it is familiar with all Federal, State, Municipal, and Department laws, codes, ordinances and regulations, which may in any way affect the Work of those employed herein, including, but not limited to, any special acts relating to the Work or to the Project of which it is a part.

.6 that it has determined what local ordinances, if any, will affect its Work. The Contractor has checked for any County, City, Borough, or Township rules or regulations applicable to the area in which the Project is being constructed and in addition, the Contractor has checked for any rules or regulations of other organizations having jurisdiction, including, but not limited to, chambers of commerce, planning commission, industries, or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls are included in the Contract Sum, even though documents of such local controlling agencies are not listed herein.

.7 that such temporary and permanent Work required by the Contract Documents as is to be done by it, can be satisfactorily constructed and used for the purposes for which it is intended, and that such construction will not injure any person or damage any property.

.8 that it is familiar with local trade jurisdictional practices.

.9 that it has carefully examined the Plans and Specifications and that, from its own investigation, it has satisfied itself as to the nature and location of the Work, the character, quality and quantity of the surface and subsurface materials likely to be encountered, the character of equipment and other facilities needed for the performance of the Work, and the general local conditions, and all other materials which may in any way affect the Work or its performance.

.10 that it is insurable in the Commonwealth of Pennsylvania.

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§ 3.20 The Contractor agrees (in addition to the representations and warranties contained in the Contract Documents), as an inducement to the Owner to execute the Contract, that the Contractor shall be restricted to the rights and remedies set forth in Article 15 of these General Conditions with respect to Claims between the Contractor and the Owner. However, the Owner's right to recover under the Contract Documents, at law or in equity shall not be restricted to the rights and remedies set forth in Article 15 of these General Conditions. This Section 3.20 shall survive the expiration or sooner termination of the Contract.

§ 3.21 Record Drawings

Contractor shall prepare and provide a set of reproducible record drawings showing significant changes in the Work made during construction based on marked-up prints, drawings and other data furnished by the Contractor to the Architect, including, but not limited to, the location of water, sewer, telephone, electric, gas and any other utility lines, and the Contractor shall certify these drawings as accurate. Said drawings shall be provided by the Contractor to the Architect.

§ 3.22 Owner's Manuals

Contractor shall turn over to Architect, for delivery to Owner, all operation manuals, maintenance instructions, and warranties for all equipment on or before the close of the Project.

ARTICLE 4 ARCHITECT AND CONSTRUCTION MANAGER

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" shall mean the Architect/Engineer or the authorized representative thereof.

§ 4.1.2 The Construction Manager is the person or entity retained by the Owner pursuant to Section 2.3.3 and identified as such in the Agreement.

§ 4.1.3 Duties, responsibilities, and limitations of authority of the Construction Manager and Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Construction Manager, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be the Owner's representatives during construction until the date the Architect issues the final Certificate for Payment and with the Owner's concurrence, from time-to-time during the warranty or correction period for correction of the Work described in Section 12.2. The Construction Manager and Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents. The Architect and Construction Manager will endeavor to guard the Owner against defects and deficiencies in the Work on the Project.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with and keep the Owner informed about the progress and quality of the portion of the Work completed, to guard the Owner against defects and deficiencies in the Work, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. On the basis of the site visits, the Architect will keep the Owner and the Construction Manager reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner and Construction Manager known deviations from the Contract Documents and defects and deficiencies observed in the Work.

§ 4.2.3 The Construction Manager shall provide one or more representatives who shall be in attendance at the Project site whenever the Work is being performed. The Construction Manager will determine in general if the Work observed is being performed in accordance with the Contract Documents, will keep the Owner and Architect reasonably informed of the progress of the Work, and will promptly report to the Owner and Architect known deviations from the Contract Documents and the most recent Project schedule, and defects and deficiencies observed in the Work.

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§ 4.2.4 The Construction Manager will observe the activities of the Contractor and inform the Architect and Owner of any deviations from the latest approved construction schedule. Project Coordinators shall schedule and coordinate the activities of the Contractor and other Prime Contractors in accordance with the latest approved Project schedule.

§ 4.2.5 The Construction Manager, except to the extent required by Section 4.2.4, and Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, and neither will be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Neither the Construction Manager nor the Architect will have control over or charge of, or be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or of any other persons or entities performing portions of the Work.

§ 4.2.6 Communications. Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall communicate with each other through the Construction Manager's and shall contemporaneously provide the same communications to the Architect about matters arising out of or relating to the Contract Documents. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Construction Manager otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with other Prime Contractors shall be through the Construction Manager and shall be contemporaneously provided to the Architect if those communication are about matters arising out of or related to the Contract Documents. Communications by and with the Owner's own forces and Separate Contractors shall be through the Owner.

§ 4.2.7 The Construction Manager and Architect will review and certify all Applications for Payment by the Contractor, in accordance with the provisions of Article 9.

§ 4.2.8 The Owner, Architect and Construction Manager have the authority to reject Work that does not conform to the Contract Documents, and will notify each other about the rejection. Whenever the Owner or Construction Manager considers it necessary or advisable, the Owner or Construction Manager will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, upon written authorization of the Owner, whether or not the Work is fabricated, installed or completed. The foregoing authority of the Owner and Construction Manager will be subject to the provisions of Sections 4.2.18 through 4.2.20 inclusive, with respect to interpretations and decisions of the Architect. However, neither the Architect's nor the Owner's or Construction Manager's authority to act under this Section 4.2.8 nor a decision made by any of them in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect, Owner or the Construction Manager to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons performing any of the Work.

§ 4.2.9 Intentionally deleted.

§ 4.2.10 The Construction Manager shall coordinate with the Prime Contractors the distribution of the submittals required by the Contract Documents for review by the Architect. The Construction Manager will require that the Prime Contractors coordinate all submittals so as to integrate the Work of other Prime Contractors and separate contractors. All Prime Contractors must review the submittals of other Prime Contractors to determine how the Work affects the Contractors' planned Work and also to coordinate and schedule all required Work. By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner, Architect, and Construction Manager that the Contractor has reviewed and recommended them for approval. Actions will be taken in accordance with a Project submittal schedule approved by the Architect or, in the absence of an approved Project submittal schedule, with reasonable promptness while allowing sufficient time to permit adequate review by the Architect. The Construction Manager is not responsible for any design aspects of the Project, and therefore, the Construction Manager's submittal responsibility shall be limited to coordinating the procedure of submittal processing with the Architect and Prime Contractors.

§ 4.2.11 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor,

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other Prime Contractors, or other separate contractors while allowing sufficient time in the Architect's professional judgment to permit adequate review. Upon the Architect's completed review, the Architect shall transmit its submittal review to the Construction Manager.

§ 4.2.12 Review of the Contractor's submittals by the Construction Manager and Architect is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Construction Manager and Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Construction Manager and Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.13 The Construction Manager will prepare Change Orders and Construction Change Directives.

§ 4.2.14 The Construction Manager and the Architect will take appropriate action on Change Orders or Construction Change Directives in accordance with Article 7, and the Architect will have authority to order minor changes in the Work as provided in Section 7.4. The Architect, in consultation with the Construction Manager, will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.15 Utilizing the documents provided by the Contractor, the Construction Manager will maintain at the site for the Owner one copy of all Contract Documents, approved Shop Drawings, Product Data, Samples, and similar required submittals, in good order and marked currently to record all changes and selections made during construction. These will be available to the Architect and the Contractor, and will be delivered to the Owner upon completion of the Project.

§ 4.2.16 The Construction Manager will assist the Architect in conducting inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion in conjunction with the Architect pursuant to Section 9.8; and receive and forward to the Owner written warranties and related documents required by the Contract and assembled by the Contractor. The Construction Manager will forward to the Architect a final Application for Payment or final Project Application upon the Contractor's compliance with the requirements of the Contract Documents.

§ 4.2.17 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Construction Manager of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.18 All Requests for Information shall be submitted by the Contractor to the Construction Manager through the web-based project management system. The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of the Construction Manager, Owner, or Contractor through the Construction Manager. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. However, the Architect shall not have the authority to bind the Owner to accept Work to which the Owner objects as being deficient or otherwise inconsistent with the Contract Documents. The Contractor shall be responsible for the Architect's fees and expenses in responding to Requests for Information where such information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner provided information, Contractor provided coordination drawings, or prior Project correspondence or documentation.

§ 4.2.19 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and in the absence of negligence, will not be liable for results of interpretations or decisions so rendered in good faith.

§ 4.2.20 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents, and if approved by the Owner .

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§ 4.2.21 The Construction Manager will receive and review requests for information from the Contractor, and forward each request for information to the Architect, with the Construction Manager's recommendation. The Architect will review and respond in writing, through the Construction Manager, to requests for information about the Contract Documents. The Architect's response to such requests will be made within 14 calendar days unless the Architect determines additional time is required. If the Architect determines additional time is required, the Architect will inform the Owner and Contractor, in writing, of the additional time needed. The Construction Manager's recommendation and the Architect's response to each request will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information at no additional cost to the Owner.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include other Prime Contractors or Separate Contractors or the subcontractors of other Prime Contractors or Separate Contractors.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor or other Sub-subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 The Contractor, shall, as stated below, notify in writing to the Construction Manager, for review by the Owner, Construction Manager and Architect, the name, trade, and subcontract amount for each Subcontractor, persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. In all cases, this notification shall be received in writing no less than thirty (30) calendar days prior to a Subcontractor starting Work. The Contractor shall not contract with any Subcontractor or supplier to whom the Construction Manager, Owner or Architect has made reasonable written objection. Within 10 business days of receipt of the information, the Construction Manager may notify the Contractor whether the Owner, the Construction Manager or the Architect (1) has reasonable objection to any such proposed person or entity or, (2) requires additional time for review. Failure of the Construction Manager to provide notice within the 10-day period shall constitute notice of no reasonable objection.

§ 5.2.1.1 Not later than 10 business days after the date of the Notice to Proceed, the Contractor shall furnish in writing to the Owner through the Construction Manager the names of persons or entities proposed as manufacturers, fabricators or material suppliers for the products, equipment and systems identified in the Project Specifications and Drawings and, where applicable, the name of the installing Subcontractor. The Construction Manager and Owner reserve the right to deduct $800.00 from the Contract Sum, as liquidated damages and not as a penalty, for each additional day that all information is not furnished in addition to all other remedies provided for herein.

§ 5.2.1.2 Not later than 30 calendar days after the date of the Notice to Proceed, the Contractor shall furnish proof in writing (if requested) that all subcontracts and purchase orders for all work in the Project Specifications have been executed. The Construction Manager and Owner reserve the right to deduct $800.00 from the Contract Sum, as liquidated damages and not as a penalty, for each day that any portion of Work has not been contracted for in addition to all other remedies provided for herein.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner, Construction Manager or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner, Construction Manager or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner, Construction Manager or Architect has no reasonable objection; however, no increase in the Contract Sum or Contract Time shall be allowed for any such substitution.

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§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner, Construction Manager or Architect makes reasonable objection to such substitution.

§ 5.2.5 Upon request, the Contractor shall furnish the Owner, Construction Manager and Architect with 1 electronic copy of any and all agreements by, between and among the Contractor and each Subcontractor along with all documentation related to such agreements. The Contractor shall name the Owner as a third-party beneficiary of each Subcontract and, whether written in such subcontract or not, each Subcontractor, having received and reviewed these General Conditions as evidenced by its execution of the subcontract, agrees that Owner shall be a third-party beneficiary of its subcontract.

§ 5.3 Subcontractual Relations

§ 5.3.1 By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, that the Contractor, by these Contract Documents, assumes toward the Owner, Construction Manager and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner, Construction Manager and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.3.2 Where Contractor sublets portions of the Work, the entire responsibility for the subdividing of work rests with the Contractor. The Owner and the Architect are not responsible for the manner of the subdivision of the Work, and neither will enter into nor settle disagreements or disputes between Contractor and Subcontractors. The arrangement of Specifications and the manner of graphic illustration of Drawings are for convenience of reference and do not comprise any exacting method of subdividing work for purposes of subcontracting, except where the Contract Documents require an undivided responsibility for certain work.

§ 5.3.3 Contractor shall require each Subcontractor to: (1) inspect surfaces and job conditions before beginning Work at Site, (2) accept or cite necessary corrections in surfaces and job conditions before beginning work at Site, and (3) protect his own materials, equipment and Work from damage, injury or loss due to weather or due to Work of the Contractor, other Subcontractors, or other Contractors. The best means of protection shall be supplied and removed when no longer required.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

Except as set forth in Section 5.4.3 hereof, when the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract accruing on or after the date of assignment.

§ 5.4.2 The Contractor agrees, upon Owner's request, to execute whatever instruments Owner may require to confirm such assignment.

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§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor Contractor or other entity, and in such case, the successor contractor or other entity and not the Owner shall assume the Contractor's rights and obligations under the subcontract accruing on or after the date of assignment.

§ 5.5 Payments to Subcontractors or Material Supplier(s) by the Contractor

§ 5.5.1 The Contractor shall pay each Subcontractor, upon receipt of payment from the Owner, an amount equal to the percentage of completion allowed to the Contractor, on account of such Subcontractor's work, less the percentage retained from payments to the Contractor. The Contractor shall also require each Subcontractor to make similar payments to Sub-Subcontractors. All such payments shall be paid within the time limits required by the Pennsylvania Contractor and Subcontractor Payment Act, 73 P.S. Sec. 501, et seq., and all other applicable legal requirements. In the event a Subcontractor or material supplier alleges that the Contractor has failed to pay it in full, the Owner may, in addition to its other rights, set off said amounts from any amount due and owing to the Contractor.

§ 5.6 Payments to Subcontractors by the Owner

§ 5.6.1 If the Owner fails to approve an Application for Payment for a cause which the Owner and Architect determine is the fault of the Contractor, and not the fault of the particular Subcontractor, or if the Contractor fails to make payment which is properly due to a particular Subcontractor, the Owner may pay such Subcontractor directly, less the amount to be retained under its Subcontract. In such case, the amount(s) paid by the Owner to such Subcontractor shall be deducted by Change Order from the Contactor's Contract Sum.

§ 5.6.2 The Owner shall have no obligation to pay, or to see to the payment of, any monies to any Subcontractor or material supplier. Nothing contained in Section 5.6.1 shall be deemed to create any contractual duty of the Owner to any Subcontractor of any tier or Supplier of any tier or to create any rights in any Subcontractor of any tier or Supplier of any tier against the Owner.

§ 5.6.3 The Contractor shall promptly advise the Owner and the Architect of any claim or demand by a Subcontractor claiming that any amount is due to such Subcontractor claiming any default by the Contractor in any of its obligations to such Subcontractor.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction with Own Forces and to Award Other Contracts

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contract in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identically or substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation. This Project will be performed with Multiple Prime Contractors as indicated in the Contract Documents. The Contractor shall be aware that schedule adjustments will be required to coordinate with the Work of their Contract with the Work of other Prime Contractors.

§ 6.1.2 When the Owner performs construction or operations with the Owner's own forces or Separate Contractors, the Owner shall provide for coordination of such forces and Separate Contractors with the Work of the Contractor, who shall cooperate with them. When the Owner performs construction or operations with the Owner's own forces including persons or entities under separate contracts administered by the Construction Manager, the Construction Manager shall provide for coordination of such forces with the Work of the Contractor, who shall cooperate with them.

§ 6.1.3 When separate prime contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Prime Contractor who executes each separate Owner-Contractor Agreement.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner's own forces, Separate Contractors, Construction Manager and other Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

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§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner's own forces, Separate Contractors or other Contractors, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Construction Manager and Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor or other Contractors that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Construction Manager and the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's or other Contractors' completed or partially completed construction is fit and proper to receive the Contractor's Work.

§ 6.2.2.1 Neither the Owner, the Construction Manager nor the Architect or their Consultants shall be responsible for the coordination of the Contractor's Work. Coordination of the Contractor's Work shall be governed by the Contract Documents.

§ 6.2.2.2 Each separate Prime Contractor shall be responsible for the coordination of their own Work with the other Prime Contractors, and for observing the requirements set forth in Division 01. The coordination of mechanical, electrical, and plumbing Work shall also be subject to the responsibility of the Project Coordinator in connection with the rendering of final construction decisions. Such responsibility shall however be invoked only after the provisions of Division 01 have been fully observed.

§ 6.2.3 Costs caused by delays, improperly timed activities or defective construction shall be borne by the parties responsible therefore, excepting, however, Owner, Architect and Construction Manager who shall not be liable to any Contractor or subcontractor for claims or damages of monetary or other nature caused by or arising out of delays of other contractors, contemplated or not contemplated. The sole remedy against the Owner, Architect, and Construction Manager for delays shall be the allowance to a successful claimant of additional time for completion of Work. If, notwithstanding the above, the Owner is required to reimburse a separate Contractor because of delays, lack of performance, improperly timed activities, or defective construction of the Contractor that failed to perform, then the Contractor responsible for the delay, lack of performance, improperly timed activities, or defective construction that Contractor shall then reimburse the Owner for the costs incurred by the Owner which are payable to the separate contractor because of delays, improperly timed activities, or defective construction of the Contractor. If the Contractor asserts a claim against the Owner, Architect, or Construction Manager in violation of the foregoing provisions, the Contractor shall, in addition to all other relief that is afforded, reimburse the Owner, Architect, and Construction Manager for its reasonable costs and fees of attorneys, architects, engineers, or other professionals, plus interest at the rate of ten (10%) percent per annum until such costs are paid. In the event that a separate contractor makes a claim or demand upon the Owner, the Architect and the Construction Manager, or any of them (notwithstanding that such claim or demand is in violation of such separate contractor's Contract for Construction with the Owner) for or on account of any actual or alleged act, omission, fault or breach of the Contract, by the Contractor, the Contractor shall indemnify and defend any and all of them from such claim or demand.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor causes to completed or partially completed construction, or to property of the Owner, Separate Contractors, or other Prime Contractors as provided in Section 10.2.5. The Contractor agrees to defend, indemnify and hold harmless the Owner, Construction Manager and Architect and the consultants, agents and employees of any of them from and against any claims or damages brought by a Prime Contractor or other separate Contractor arising out of actions or omissions of the Contractor, or his Subcontractors, Sub-subcontractors, or suppliers in performing its Work under the Contract Documents. Should the Contractor wrongfully cause damage to the Work or property of any separate Contractor, the Contractor shall, upon due notice, promptly attempt to settle with the separate Contractor by agreement, or otherwise to resolve the dispute. Such dispute shall not delay the completion of the Work. The separate Contractor claiming damages at his expense subject to his right to recover damages shall continue Work. If such separate contractor sues the Owner, the Architect, or Construction Manager on account of any damage alleged to have been caused by another Contractor, the Owner, Architect or Construction Manager shall notify such other Contractor who shall defend such proceedings at the Contractor's expense, and if any judgment or award against the Owner, Construction Manager, or Architect arises therefrom the notified Contractor shall pay or satisfy it and shall reimburse the Owner, Construction Manager, or Architect for all attorneys' fees and court costs which the Owner, Construction Manager, or Architect has incurred.

§ 6.2.4.1 If any Prime contractor sues the Owner, Construction Manager, or the Architect on account of any damage alleged to have been caused by another Contractor, the Owner, Construction Manager, or Architect, shall notify the Contractor that allegedly caused the damage. That Contractor shall defend such proceedings at the Contractor's

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expense, and if any judgment or award against the Owner, Construction Manager, or Architect arises therefrom the Contractor shall pay or satisfy it and shall reimburse the Owner, Construction Manager, or Architect for all attorneys' fees and court costs which the Owner, Construction Manager, or Architect has incurred.

§ 6.2.5 The Owner, Separate Contractors, Prime Contractors and other Contractors shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.2.5.1 If the Contractor, or any of its Subcontractors or Sub-Subcontractors, or their respective agents, servants, or employees, causes damage to the Work or property, or by lack of due diligence delays or interferes with the Work of another Contractor, Subcontractor, or other Prime Contractor or their subcontractors, and such party incurs additional expense or damage as a result, any claim, dispute, or other matter arising therefrom shall be resolved exclusively by binding arbitration as provided in this Section 6.2.5. Such arbitration shall be conducted in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then in effect, unless the affected parties mutually agree otherwise in writing. Claims between or among Contractors, Subcontractors, other Prime Contractors, or their respective Sureties shall not delay or suspend the progress or completion of the Work, which shall continue pending final resolution of such claims.

§ 6.2.5.2 The Owner, Architect, and Construction Manager shall not be joined as parties to any arbitration or dispute arising under this Section 6.2.5, nor shall they be liable for damages arising out of disputes between or among Contractors, Subcontractors, other Prime Contractors, or their respective Sureties. The Contractor and its Subcontractors expressly waive any claims against the Owner, Architect, and Construction Manager for damages arising from the acts, omissions, delays, or interference of other Contractors, Subcontractors, other Prime Contractors, or their subcontractors, including, without limitation, claims for delay, acceleration, inefficiency, out-of-sequence work, stacking of trades, overtime, or disputes over scope of work.

§ 6.2.5.3 A demand for arbitration shall be made in writing and filed with the American Arbitration Association and served upon the other affected Contractors or Subcontractors within thirty (30) calendar days after the claimant knew or should have known of the claim. Copies of the arbitration demand shall be provided to the Owner, Architect, and Construction Manager for informational purposes only. While not parties to the arbitration, the Owner, Architect, and Construction Manager may, if requested, provide testimony or documentary evidence as witnesses. The Owner shall receive copies of documents submitted to the arbitrator at no cost. The arbitration award shall be final, and judgment upon the award may be entered in any court of competent jurisdiction.

§ 6.2.5.4 The Contractor and each of its Subcontractors agree that their sole and exclusive remedy for any injury, damage, loss, or expense arising out of disputes covered by this Section 6.2.5 shall be against the responsible Contractor, Subcontractor, other Prime Contractor, or their respective Sureties, and not against the Owner, Architect, or Construction Manager. This Section 6.2.5 is intended to benefit all Prime Contractors, Subcontractors, and their Sureties on the Project and shall confer limited third-party beneficiary status solely for the purpose of enforcing the arbitration and risk-allocation provisions contained herein. The Contractor shall require all Subcontracts and Sub-Subcontracts to include provisions substantially similar to this Section 6.2.5 as a condition of participation in the Project.

§ 6.2.5.5 The Contractor and each of its Subcontractors acknowledge that the restrictions contained in these General Conditions are reasonable and necessary in order to protect the legitimate interests of the Owner and that any violation of these General Conditions would result in irreparable injuries to the Owner and monetary damages would be inadequate to compensate the Owner for a violation of these General Conditions. Therefore, the Contractor and each of its Subcontractors hereby agree that if the Contractor or Subcontractor disregard any paragraph of these General Conditions, including, without limitation, any portion of this Article 6, and institutes or attempts to institute any proceeding (e.g., arbitration, litigation, mediation, etc.) against the Owner, Architect, or Construction Manager for including, without limitation, injuries, damages or expenses resulting from disputes between or among Contractor, Sureties, Subcontractors, other Prime Contractors or their Subcontractors, the Owner is entitled to obtain from any court of competent jurisdiction preliminary and permanent injunctive relief to prevent the Contractor or Subcontractor from pursuing any proceeding against the Owner, Architect, or Construction Manager, and the Owner is entitled to stay any such proceeding. In the event that the Owner pursues preliminary or permanent injunctive relief to prevent the Contractor from pursuing any proceeding against the Owner, Architect, or Construction Manager, or that the Owner attempts to stay any such proceeding, the Contractor and the Contractor's Surety shall be jointly and severally liable for reimbursing the Owner, immediately upon demand, for all of Owner's costs and expenses associated therewith,

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including, without limitation, all legal fees, professional fees, and all other costs associated therewith incurred by the Owner. In the event that the Owner pursues preliminary or permanent injunctive relief to prevent a Subcontractor from pursuing any proceeding against the Owner, Architect, or Construction Manager or that the Owner attempts to stay any such proceeding, the Subcontractor and the Subcontractor's Surety (if any) shall be jointly and severally liable for reimbursing the Owner, immediately upon demand, for all of Owner's costs and expenses associated therewith, including, without limitation, all legal fees, professional fees, and all other costs associated therewith incurred by the Owner. The Owner's rights set forth in this Section 6.2.5.5 shall be in addition to all other rights of the Owner granted in the Contract Documents, at law, or in equity.

§ 6.2.6 Dispute Routing.

Claims, disputes, or matters exclusively between or among Prime Contractors, Subcontractors, or Sub-Subcontractors arising out of coordination, sequencing, delay, interference, or damage to the Work shall be resolved solely in accordance with Article 6 and shall not be asserted against the Owner, Architect, or Construction Manager.

Claims by a Contractor against the Owner shall be asserted only in accordance with Article 15. Resolution of a dispute under Article 6 shall not create, expand, or imply any duty, obligation, or liability of the Owner, Architect, or Construction Manager.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, other Multiple Prime Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Construction Manager, with notice to the Architect, will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Construction Manager, Architect and Contractor. A Construction Change Directive requires agreement by the Owner, Construction Manager and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, after receipt of a letter to proceed issued by the Construction Manager or execution of the Change Order, Construction Change Directive, or order for a minor change in the Work, whichever occurs first.

§ 7.1.3.1 Notwithstanding anything contained in the Contract Documents to the contrary, a change in the Contract Sum, the Contract Time and/or any Milestone Date shall be accomplished only by Change Order or by a Construction Change Directive. No course of conduct or dealing between the parties, no express or implied acceptance of alterations or additions of the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work shall be the basis of any claim or adjustment in compensation due under the Contract and/or time period provided for under the Contract.

§ 7.1.3.2 Agreement on any Change Order shall constitute a final settlement of all direct and indirect costs associated with such change and any and all adjustments to the Contract Sum and the Contract Time. In the event a Change Order increases the Contract Sum, the Contractor shall include the Work covered by such Change Order in Applications for Payment as if such Work were originally part of the Contract Documents. Present or future claims by the Owner relating to defective performance of the Work shall not be deemed settled through agreement on a Change Order unless so expressly agreed in writing.

§ 7.1.4 Matters involving extra Work and changes in the Work are subject to the following provisions:

§ 7.1.4.1 Owner reserves the right to accept or reject Contractor's price, and in instances of more than one price, to accept one or more prices, or reject one or more or all prices. Contractor may not make a charge of any kind regarding proposed extra Work or proposed changes in the Work that were not accepted.

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§ 7.1.4.2 Contractor agrees that prices for changes in the Work and or extra Work will not include charges involving penalties or damages for assumed delays in the Work, charges for estimating, cancellation charges on prior rejected Work, and similar amounts which do not relate directly to costs of labor and material and equipment appurtenant to Work involved.

§ 7.1.4.3 A Change Order or Construction Change Directive will establish whether the Contractor is permitted extra time because of extra Work or changes in the Work and, if so, the amount of extra time permitted. Such determinations will be final and will not alter the fact that time is of the essence in the Contract.

§ 7.1.4.4 No charges by Contractor for extra Work or changes in the Work, nor claims on account thereof, shall be valid unless duly authorized pursuant to the procedure herein described. Written authority to perform extra Work or changes in the Work must be in possession of Contractor before such Work commences in order that Contractor's right to payment on account thereof may be valid.

§ 7.1.4.5 In order to facilitate checking of quotations for adjustments in the Contract Sum, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including, labor, materials, and subcontracts. Labor and materials shall be itemized in the manner prescribed herein. When major cost items are subcontracted, these costs shall be itemized also.

§ 7.1.4.6 All Change Orders shall be accompanied by detailed price breakdowns.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Construction Manager and signed by the Owner, Construction Manager, Architect, and Contractor, stating their agreement upon all of the following:

.1 The change in the Work;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Section 7.3.3.

§ 7.2.3 To the extent the Contractor makes an excessive number of Change Order requests, which excessiveness shall be determined solely in the discretion of the Owner, the Owner shall have the authority in its sole discretion, to disregard any subsequent Change Order requests made by such Contractor on the same or similar scope of services and the Contractor's sole remedy against the Owner under this Agreement shall be pursuant to Article 15 of these General Conditions. Furthermore, to the extent the Owner incurs any legal fees, professional fees, expenses, or costs (including, but not limited to, employee costs), arising out of or resulting from the Contractor making an excessive number of Change Order requests, the Contractor shall be liable to the Owner for such legal fees, professional fees, expenses, and costs.

§ 7.2.4 Any action(s) by the Owner, Construction Manager, Architect and/or the Contractor other than actions taken pursuant to the procedures set forth in Section 7.2.1 shall not constitute the approval of a Change Order, including, without limitation, the Owner's, Construction Manager's and/or the Architect's execution of the Contractor's time sheets upon which the Contractor submits a Change Order request. Furthermore, to the extent the Owner incurs any legal fees, professional fees, expenses, or costs (including, but not limited to, employee costs), arising out of or resulting from the Contractor's failure to follow the proper procedures for approval of a Change Order, the Contractor shall be liable for such legal fees, professional fees, expenses and costs.

§ 7.2.5 At Owner's election, Change Order costs shall be calculated by the Contractor and each Subcontractor or Sub-sub contractor as follows:

§ 7.2.5.1 Actual costs of labor, including social security and old age and unemployment insurance, fringe benefits and workers' compensation insurance associated with the Change in the Work (as calculated per Section 7.3.4).

§ 7.2.5.2 Actual costs of materials, supplies and equipment, including cost of transportation used in performing the Change in the Work.

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§ 7.2.5.3 Actual rental costs of machinery and equipment rented from third parties, exclusive of hand tools required by the Change in the Work, whether incorporated or consumed.

§ 7.2.5.4 Actual costs of premiums for all bonds and insurance and permit fees and sales, use or similar taxes related to the Change in the Work.

§ 7.2.5.5 For any adjustments to the Contract Sum (other than those based upon unit prices which include overhead and profit), the Prime Contractor agrees to charge and accept, as payment for overhead and profit, the following percentages of costs attributable to the addition, deletion or change to the Work.

.1 For adjustments which total less than fifty thousand dollars ($50,000) exclusive of overhead and profit, a total of 10% for overhead and profit.

.2 For adjustments which total more fifty thousand dollars ($50,000) but less than two hundred fifty thousand dollars ($250,000), exclusive of overhead and profit a total of 8% for overhead and profit.

.3 For adjustments which total more than two hundred fifty thousand dollars ($250,000) exclusive of overhead and profit, a total of five percent (5%) for overhead and profit.

.4 When both additions and credits are involved in any one change, the allowance for overhead and profit shall be figured on the basis of the net increase, if any

.5 To the Contractor for work performed by other than its own forces (i.e. their subcontractors), the allowance for overhead and profit shall not exceed 5%.

.6 The charges for overhead and profit referred to herein shall include all indirect costs customarily recoverable as overhead, including home office overhead and field office overhead Nothing here in shall be deemed to waive any rights the Contractor may have under applicable Pennsylvania law to recover damages arising from delays caused by the Owner's active interference or other non-waivable conduct, unless expressly provided elsewhere in this Agreement.

§ 7.2.6 Unit Prices and their use in Contract Adjustments

§ 7.2.6.1 If Unit Prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such Unit Prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable Unit Prices shall be equitably adjusted.

§ 7.2.6.2 Approved Unit Prices, when accepted by the Construction Manager and Owner, shall be used where they apply to determine an equitable adjustment of the Contract Sum in connection with extra Work or changes ordered under the Contract. Approved Unit Prices shall apply to both additions to and deductions from the Contract Sum.

§ 7.2.6.3 Unit Prices submitted by a Contractor on the Bid Form for this Project shall include all profit, overhead, bonds, insurance, taxes, labor, materials, plant equipment and tools necessary and required to fully complete the Work item, as specified in detail for the Work item in the Contract Documents.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Construction Manager and signed by the Owner, Construction Manager and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be allocated based on the approved Schedule of Values based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

.2 Unit prices stated in the Contract Documents or subsequently agreed upon;

.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or

.4 As provided in Section 7.3.4.

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§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Construction Manager shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.2.5.5,and which includes, without limitation, Contractors obligations under these General Conditions and Division 01 of the Specifications. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Construction Manager may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

.1 Costs of labor, including applicable payroll taxes such as social security, old age and unemployment insurance, fringe benefits required by agreement or custom, workers' compensation insurance, labor costs shall be the certified Base Prevailing Wage rate plus actual fringe benefits per the Prevailing Wage Determination Schedule included in the Project Manual plus FICA, SUTA, FUTA and Workmen's Compensation, and other employee costs approved by the Construction Manager and Architect;

.2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Additional costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and all bonds and insurance, permit fees, and sales use, or similar taxes directly related to the change shall be submitted without markup;

.5 Costs of supervision and field office personnel directly attributable to the change

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Owner, Architect, and Construction Manager of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time. Notwithstanding anything else to the contrary in the Contract Documents, when a Construction Change Directive is not agreed upon by the Contractor, the Contractor shall continue to perform the change in the Work involved so as not to delay the Project and the Contractor's sole remedy against the Owner under this Agreement shall be pursuant to Article 15 of these General Conditions.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost plus overhead and profit as confirmed by the Construction Manager and Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment to the extent that such Work was completed under the Construction Change Directive. For any portion of such cost that remains in dispute, t he Construction Manager and Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Construction Manager and Architect determine to be reasonably justified. The interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Construction Manager and Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Construction Manager shall prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive. The Contractor's

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agreement to a Change Order, or acceptance of payment therefore, or the Contractor's agreement to a Construction Change Directive, shall constitute a final settlement of all of the Contractor's rights, claims, and remedies relating to the change in the Work which is the subject matter thereof, including, without limitation, all direct and indirect costs, and all adjustments to the Contract Sum and the Contract Time or Project Construction Schedule. If the Owner and the Contractor do not agree with the Construction Manager's determination, then the parties shall resolve the dispute pursuant to the terms and conditions of Article 15.

§ 7.4 Minor Changes in the Work

§ 7.4.1 The Architect has the authority to order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing issued through the Construction Manager and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Construction Manager and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Construction Manager that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 7.4.2 The Architect from time to time, as deemed necessary or if requested by the Owner and Construction Manager, will furnish supplementary instructions to clarify or amplify the Drawings and Specifications (Contract Documents). The supplementary instructions may be by means of drawings, or otherwise as is most appropriate, which will be consistent with the Contract Documents and true developments thereof, or amplifications reasonably inferable therefrom. The supplementary instructions shall be considered minor clarifications in the Work and shall not be an authorization for the Contractor to incur additional cost.

§ 7.4.3 The Owner reserves the right to change the location of any piece of apparatus or equipment within five (5) feet of location shown, up to the time of rough-in, without additional expense to the Owner. The changes of the location shall be considered minor changes in the Work and shall not be an authorization for the Contractor to incur additional cost.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Notice to Proceed issued by the Owner or Construction Manager. The date shall not be postponed by the failure to act of the Contractor or of persons or entities for whom the Contractor is responsible .

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time, including the phasing schedule, and all activities, events, and milestones is a reasonable period for performing the Work. By bidding and by executing the Agreement, the Contractor confirms that the contract duration is a reasonable period for performing the work. Any preliminary construction schedule, if provided, is for information purposes only and constitutes a proposed sequence of events based on standard practices. Contractor shall independently analyze all required activities and durations necessary to perform their own work and shall not rely on dates or duration suggested by the preliminary construction schedule. The Contractor is responsible to provide the Construction Manager a detailed Construction Schedule of their work within ten (10) business days after the date of execution of the Contract and a Construction Progress Schedule that will be updated periodically to reflect progress. The dates listed in the construction schedule are of the essence and the Contractor agrees to schedule, coordinate, and staff in accordance therewith based on the actual progress of the Work as necessary to maintain the orderly progress of the Work in accordance with the construction schedule.

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§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required by Article 11, to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time. The Contractor agrees to increase manpower, increase work hours, and to increase equipment, necessary to maintain projected progress schedule. Such measures undertaken by the Contractor will be at no additional cost to the Owner.

§ 8.2.4 The Notice to Proceed shall be given to the Contractors on all branches of Work concurrently and all Contractors shall be prepared to undertake their Work at such times as the progress of the Work permits them to do so.

§ 8.2.5 The Work shall reach Substantial Completion no later than the date(s) stated in the Contract Documents, and for each milestone and phase where applicable, subject to conditions stated therein, from the date of commencement of Work including authorized extensions of time approved in writing by the Owner. All Contractors shall cooperate with each other and shall coordinate their activities and Work so that the entire program of construction can be substantially complete on or before the completion dates for each milestone and phase.

§ 8.2.6 The Contractor shall complete the whole of the Work, and all milestones and phases as applicable, at or before the time or times stated. Contractor shall submit shop drawings and samples of material to be used, as required, and make delivery of material in accordance with the Project schedule. Contractor shall furnish, at all times, sufficient skilled workers, materials, and equipment to perform the Work to the entire satisfaction of the Construction Manager, Architect, and Owner and so as not to delay the completion of the whole or any part of the Project.

§ 8.2.7 It is mutually agreed by and between the parties hereto that time is of the essence as to each part of the Contract and that in case of the failure on the part of the Contractor to complete any part of the Contract within the time specified and agreed upon, the Owner will be damaged thereby. Further, it is mutually agreed that the amount of said damages, including, but not limited to, expenses for inspection, superintendence and necessary traveling expenses, being difficult, if not impossible, of definite ascertainment and proof, it is hereby agreed that the reasonable amount of liquidated damages in accordance with Section 9.11 of these General Conditions shall be the Owner's remedy.

§ 8.2.7.1 In addition to the liquidated damages set forth in Section 9.11, the Contractor agrees to pay all associated costs for the Construction Manager and Architect to extend their agreement to remain on the Project due to the failure of the Contractor to complete the Work within the time frame stipulated. Damage to other Contractors that are an extension of this clause, are to be recovered pursuant to Section 6.2 of these General Conditions.

§ 8.2.8 Adherence to Schedule

§ 8.2.8.1 The Owner reserves the right to withhold monthly progress payments if the Contractor is behind schedule, unless the Contractor proves, in writing, that the delays are not the fault of the Contractor and to which the Construction Manager agrees.

§ 8.2.8.2 The monthly progress payments will only be released after the Contractor reaches the status of completion for that month comprehended by the Project construction schedule.

§ 8.2.8.3 In the event the Construction Manager determines that the performance of the Work has not progressed or reached the level of completion required by the Contract Documents and the Project construction schedule, the Owner or Construction Manager shall have the right to order the Contractor to take corrective measures necessary to expedite the progress of construction, including, but not limited to, working additional shifts or overtime; supplying additional manpower, equipment, and facilities; and other similar measures (referred to collectively as "Extraordinary Measures"). Such Extraordinary Measures shall continue until the progress of the Work complies with the stage of completion required by the Contract Documents. The Owner's right to require Extraordinary Measures is solely for the purpose of ensuring the Contractor's compliance with the Project construction schedule and failure to comply shall be considered as breach of the Contract Documents. The Contractor shall not, under any circumstances, be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by Owner under or pursuant to Section 8.2.8.

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§ 8.2.8.4 The Owner may exercise its rights pursuant to Section 8.2.8.3 as frequently as the Owner deems necessary to ensure that the Contractor's performance of the Work will comply with any completion dates set forth in the Contract Documents.

§ 8.2.9 PROCUREMENT SCHEDULE

If requested by the Construction Manager, the Contractor shall provide a procurement schedule within a reasonable period of time which shows items to be purchased, date of purchase, quoted dates of delivery, current estimated date of delivery, and last date of contact with the vendor. The procurement schedule shall be updated as requested by the Construction Manager.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed in the commencement or progress of the Work by any of the following clauses, the Contract Time shall be extended by Change Order for such reasonable period as determined by the Architect, based on the recommendation of the Construction Manager: (1) an act or omissions of the Owner, Owner's forces, Construction Manager, Architect, or any other Prime Contractors; (2) by changes ordered in the Work, (3) by , unavoidable delay in deliveries, casualties, fire, flood, epidemic, pandemic, disease, declared state of emergency by local, state or federal government, or other proven causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation, arbitration, or by litigation, (5) or by other proven causes that the Architect determines may justify delay, Extension of Contract Time shall be considered for delays caused by rain, wind, flood, or any other natural phenomena of severity normally experienced at the Project location only if the conditions listed in Section 15.1.6.2 of these General Conditions at met.

§ 8.3.1.1 After award of the Contract, no claims for additional compensation associated with completing the Work within the Contract Time shall be considered. The Contract Sum includes all costs associated with meeting the required schedule, including, without limitation, shift work, overtime, premium time, sequencing constraints, and coordination with other Prime Contractors. Failure of the Contractor to anticipate or include such costs shall not relieve the Contractor of its obligation to comply with the schedule nor entitle it to additional compensation.

§ 8.3.1.2 No extension of Contract Time shall be granted for delays caused by the Contractor's failure to properly plan, staff, supervise, coordinate, procure materials, prepare shop drawings, or otherwise perform the Work using reasonable diligence. Delays resulting from such causes are solely the Contractor's responsibility.

§ 8.3.2 Except as expressly provided in Section 8.3.4, an extension of Contract Time shall be the Contractor's sole and exclusive remedy for all delays, disruptions, interferences, or hindrances to the Work, and shall not entitle the Contractor to recover damages or additional compensation from the Owner, Architect, or Construction Manager.

§ 8.3.3 All claims for extensions of Contract Time shall be made strictly in accordance with Article 15.

§ 8.3.4 Notwithstanding anything to the contrary in the Contract Documents, the Contractor agrees that an extension of Contract Time shall be the sole remedy for any: delay in commencement, prosecution, or completion of the Work; hindrance or obstruction of performance; loss of productivity; acceleration, sequencing changes, or out-of-sequence work; or other similar impacts. No compensation or damages of any kind shall be due from the Owner, Architect, or Construction Manager, including, without limitation, consequential damages, lost profits, impact damages, winter protection costs, or opportunity costs. Exception. Damages may be recoverable only to the extent a delay is caused by the Owner's active interference with the Contractor's performance, continues after the Contractor provides written notice of such interference, and is not otherwise waived by the Contract Documents. The Owner's exercise of contractual rights—including directing changes, suspensions, resequencing, or corrections—shall not constitute active interference. Any time extension granted shall be day-for-day equivalent to the proven time lost.

§ 8.3.5 The Contractor acknowledges that construction schedules will be updated as the Project progresses. No claim for additional compensation shall be permitted for acceleration, delay, or out-of-sequence work resulting from decisions made pursuant to this Section 8.3 or from reasonable schedule updates.

§ 8.3.6 No extension of Contract Time shall constitute a waiver of any rights of the Owner or relieve the Contractor of its obligation to complete the Work in accordance with the Contract Documents.

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§ 8.3.7 If the Owner is prevented or enjoined from proceeding with the Project due to litigation or other causes beyond the Owner's control, the Contractor shall not be entitled to damages, acceleration costs, or out-of-sequence work costs. The Contract Time shall be extended by a reasonable period reflecting time lost, as determined by the Owner and Architect in writing.

§ 8.3.8 Delays attributable to lack of coordination or cooperation among the Contractor, its Subcontractors, Sub-Subcontractors, or other Prime Contractors shall not justify an increase in the Contract Sum or Contract Time and shall be resolved in accordance with Section 6.2.

§ 8.3.9 Delay Remedies Clarified.
Except as expressly stated in this Article, an extension of Contract Time shall be the Contractor's sole and exclusive remedy for delays, disruptions, interferences, or hindrances to the Work. Nothing in this Contract shall be construed as waiving claims expressly preserved under Section 8.3.4 or rights that are not legally waivable under applicable law.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents. In the event and to the extent that the Owner provide insurance in accordance with Article 11 of this Contract, the Contract Sum shall exclude the Contractors' and Subcontractors' related costs for the insurance being provided in accordance with Article 11.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Within 10 business days of receipt of the Notice to Proceed, the Contractor shall submit a schedule of values to the Construction Manager and Architect, before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Construction Manager and the Architect. This schedule, unless objected to by the Construction Manager or Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.2.1 Projects with multiple sites or multiple phased projects, provided separate schedule of values for each building, phase or site.

§ 9.2.2 The schedule of values shall include the following line items with values calculated as follows:

Final Paperwork: 1% of Contract value.

§ 9.2.3 The Schedule of Values shall be broken down with separate line items for labor and materials corresponding to the Specification Sections.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten calendar days before the date established for each progress payment, the Contractor shall submit to the Construction Manager an itemized Application for Payment prepared in accordance with the schedule of values and Contract Documents, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner, Construction Manager or Architect require, such as copies of requisitions, and releases of waivers of lien from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents. The form of Application for Payment shall be a template provided by the Construction Manager. Construction Manager will issue an Invitation to Bill monthly through the web-based Project Management system. By signing each Application for Payment, the Contractor stipulates and certifies to the following: that the information presented is true, correct, accurate and complete; that the Contractor has made the necessary detailed examinations, audits and arithmetic verifications; that the submitted Work has been completed to the extent represented in the Applications for Payment; that the materials and supplies identified in the Applications for Payment have been purchased, paid for and received; that the Subcontractors have

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been paid as identified in the Applications for Payment or that Contractor has been invoiced for same; that he has made the necessary on-site inspections to confirm the accuracy of the Applications for Payment; that there are no known mechanics' or materialmens' liens outstanding at the date of this requisition; all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current application; that except for such bills not paid but so included, there is no known basis for the filing of any mechanics' or materialmens' liens on the Work; that the Payment Application includes only Work self-performed by Contractor or for which Contractor has been invoiced; and that releases from all Subcontractors and materialmen have been obtained in such form as to constitute an effective release of lien under the laws of the Commonwealth of Pennsylvania covering all Work performed and for which payment has been made by the Owner to the Contractor.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Construction Manager and Architect, but not yet included in Change Orders. Owner may withhold payment on disputed Construction Change Directive amounts.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.1.3 Work applicable to the Contract Sum shall be kept separate from Work applicable to Change Orders. The Work of each shall contain a summary and a breakdown as stipulated by the Contract Documents.

§ 9.3.1.4 Contractor expressly waives any right to penalties, interest, and attorney's fees pursuant to the prompt payment provisions of the Pennsylvania Commonwealth Procurement Code, 62 Pa. C.S. § 3931 et seq.

§ 9.3.2 Stored Materials

§ 9.3.2.1 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.2.2 Materials stored off the construction site shall not be included for payment in the Contractor's application for payment unless prior written approval of the Owner has been obtained. Payment for materials stored off the construction site shall be subject to the conditions in this Section 9.3.2 and the following additional conditions:

.1 Contractor shall provide property insurance for the full cost of the materials stored off the construction site.

.2 Contractor shall provide a bill of sale for the materials granting clear title to the materials to the Owner.

.3 Contractor shall provide waivers of liens, encumbrances or claims relating to the bailment of the materials stored off site or as otherwise required by Owner.

.4 Contractor shall provide Owner all information necessary for the filing of any notices under the Uniform Commercial Code relating to the materials stored off the construction site as may be required by Owner.

.5 The materials stored off the construction site shall be clearly and conspicuously labeled so as to identify Owner's title to the materials and shall be segregated and not commingled with other materials at the storage location.

.6 Contractor shall pay all storage costs, shall be responsible for any damage or deterioration of the materials while in storage or in transit to the construction site and shall pay the cost of inspection of the materials in storage by the Owner.

.7 Contractor shall be responsible for and shall pay all costs of transportation of the materials to the construction site.

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.8 Neither Owner's payment for materials stored off the construction site nor the transfer of title to Owner shall in any way reduce Contractor's liability for the complete installation and construction relating to said materials or liability under any performance bond provided for the Project.

.9 Contractor agrees to make the materials available for inspection by the Owner or Owner's representative at any time upon Owner's request.

§ 9.3.2.3 Materials stored on or off site shall be covered at all times from the weather. Any material or equipment, including outdoor exposed equipment, shall be suitably covered and protected at all times until final installation.

§ 9.3.2.4 The Contractor in making or ordering material shipments shall not consign or have consigned materials, equipment or any other items in the name of the Owner. The Owner shall not be under any obligation to make payment for charges on shipments made by or to the Contractor but may, at its option, pay such charges in which case the Contractor shall reimburse the Owner for the amount of such payments plus a service charge of twenty-five percent (25%) of the amount so paid.

§ 9.3.2.5 Materials delivered and stored both on and offsite are the responsibility of the Contractor. The Contractor shall be solely responsible for their safekeeping and usability at the time they are to be incorporated in the Work, and shall, at their own expense, care for and protect the same, employ security as needed, and take out insurance against theft, loss from other cause, damage, destruction and/or such other risks as may be involved which would render the aforesaid materials unfit or unsuitable for use in the Project. Any lost, stolen, or damaged materials shall be replaced at Contractor's expense. Materials shall not be delivered earlier than reasonably necessary for proper progress of the Work unless prior approval is granted by the Owner.

§ 9.3.2.6 All material and work incorporated in the Work covered by partial payments made shall thereupon become the sole property of the Owner, but this provision shall not be construed as relieving the Contractor from the sole responsibility for the care and protection of materials and Work upon which payments have been made or the restoration of any damaged Work, or as a waiver of the right of the Owner to require the fulfillment of all the terms of the Contract.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials and equipment relating to the Work. Contractor shall indemnify, defend, and hold Owner harmless from any liens, claims, security interests or encumbrances filed by the Contractor, Subcontractors, or anyone claiming by, through or under the Contractor or Subcontractor for items covered or partially covered by payments made by the Owner to Contractor.

§ 9.3.4 Retainage

§ 9.3.4.1 In accordance with 62 Pa. C.S.A §3921, the Owner shall retain ten percent (10%) of all amounts due the Contractor until the Work is fifty percent (50%) completed. When the Work is fifty percent (50%) completed, one-half of the amount retained by the Owner may be returned to the Contractor, provided the Contractor provides written Consent of Surety to such reduction in retainage to the Construction Manager along with its Application for Payment, provided the Architect approved the Application and reduction of retainage, and further provided that the Contractor is making satisfactory progress and there is no specific cause for greater withholding. A specific cause for greater withholding shall include, without limitation, the following:

.1 The Contractor's inability to produce evidence satisfactory to the Construction Manager and/or the Owner evidencing payments for materials, labor and/or payments to Subcontractors, manufacturers or suppliers.

.2 The existence of a dispute between the Owner and the Contractor regarding increased costs claimed by such Contractor.

.3 Contractor's failure to complete the Work in accordance with the Contract Documents, including without limitation, the Drawings and Specifications.

.4 Defective Work or damaged Work identified subsequent to installation.

.5 Failure to comply with any of the Project requirements including, but not limited to, schedule, coordination, staffing, supervision, subcontractors, submittals, etc.

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§ 9.3.4.2 In addition to the Owner's right to determine if a specific cause for greater withholding exists, the Architect and Construction Manager shall be entitled to determine if a specific cause for greater withholding exists under this Section. The Architect and Construction Manager may, with Owner's approval, reject the reduction in retainage if the Contractor is not making satisfactory progress in its Work or if the Architect and Construction Manager determine that there is a specific cause for greater withholding. The Architect and Construction Manager will consider the following items when reviewing a request for reduction in retainage and failure to meet any of the following requirements may be considered by the Architect and Construction Manager as sufficient grounds for rejecting a reduction of retainage.

.1 Satisfactory performance of the Work.
.2 Satisfactory maintenance of the Project schedule.
.3 Proper manning of the Project.
.4 Satisfactory completion of the Work.
.5 Satisfactory organization of the Project.
.6 Proper organization and coordination of Subcontractors.
.7 Proper coordination with other Prime Contractors, Owner's forces, and separate contractors.
.8 All defective Work has been remedied or is in the process of being remedied.
.9 Work completed is not in contention.
.10 Satisfactory follow through of paperwork, certified payrolls, Change Order proposals, or Construction Change Directives.
.11 Satisfactory compliance with all government code statutes, regulations and laws including but not limited to local government ordinances and the rules and regulations promulgated for the PA Department of Environmental Protection and the County Conservation District.
.12 The Architect's and Construction Manager's decision to reject a reduction of retainage shall be final and binding on the Prime Contractors.

§ 9.3.4.3 The Owner shall retain five percent (5%) of all amounts due the Contractor after the Work is fifty percent (50%) completed. In the event a dispute arises between the Owner and a Prime Contractor or separate contractor, which dispute is based upon increased costs claimed by the Prime Contractor or separate contractor occasioned by delays, or other actions of the Contractor, additional retainage in the sum of one and one-half times the amount of any possible liability may be withheld until such time as a final resolution is agreed to by all parties directly or indirectly involved, unless the Contractor furnishes a bond satisfactory to the Owner to indemnify the Owner against the full claim.

§ 9.3.4.4 The full Contract retainage may be reinstated if the manner of completion of the Work and its progress do not remain satisfactory to the Owner, Construction Manager and Architect, or if the Surety withholds its consent, or for other good and sufficient reasons.

§ 9.3.4.5 All monies retained by the Owner may be withheld from the Contractor until substantial completion of the Project.

§ 9.4 Certificates for Payment

§ 9.4.1 Intentionally deleted.

§ 9.4.2 The Construction Manager will, within seven calendar days after the Construction Manager receives the Contractors' Applications for Payment: (1) review the Applications and certify the amount the Construction Manager determines is due to each of Prime Contractor; (2) prepare a Summary of Contractors' Applications for Payment by combining information from each Prime Contractor's application with information from similar applications for progress payments from the other Prime Contractors; (3) prepare a Project Application and Certificate for Payment; (4) certify the amount the Construction Manager determines is due to each Prime Contractor; and (5) forward the Summary of Contractors' Applications for Payment and Project Application and Certificate for Payment to the Architect.

§ 9.4.2.1 Within seven calendar days after the Architect receives the Project Application and Project Certificate for Payment and the Summary of Contractors' Applications for Payment from the Construction Manager, the Architect will either (1) issue to the Owner a Project Certificate for Payment, with a copy to the Construction Manager; or (2) issue to the Owner a Project Certificate for Payment for such amount as the Architect determines is properly due, and notify the Construction Manager and Owner of the Architect's reasons for withholding certification in part as provided

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in Section 9.5.1; The Construction Manager will promptly forward the Architect's notice of withholding certification to the Contractors no later than the date established for such progress payment .

§ 9.4.3 The Construction Manager's certification, a Project Application and Certificate for Payment, shall be based upon the Construction Manager's evaluation of the Work and the data in the Application or Applications for Payment. The Construction Manager's certification will constitute a representation that, to the best of the Construction Manager's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.4 The Architect's issuance of a Certificate for Payment or, in the case of more than one Contractor, Project Application and Certificate for Payment, shall be based upon the Architect's evaluation of the Work, the recommendation of the Construction Manager, and data in the Application for Payment or Project Application for Payment. The Architect's certification will constitute a representation that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is, or Contractors are, entitled to payment in the amount certified.

§ 9.4.5 The representations made pursuant to Sections 9.4.3 and 9.4.4 are subject to continuing observations and ongoing evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Construction Manager or Architect.

§ 9.4.6 The issuance of a Certificate for Payment or a Project Certificate for Payment will not be a representation that the Construction Manager or Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Construction Manager or Architect may withhold a Certificate for Payment or Project Certificate for payment, shall not certify payment, and will withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Construction Manager's or Architect's option, the representations to the Owner required by Section 9.4.3 and 9.4.4 cannot be made. If the Construction Manager or Architect is unable to certify payment in the amount of the Application, the Construction Manager will notify the Contractor and Owner as provided in Section 9.4.2. If the Contractor, Construction Manager and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment or a Project Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Construction Manager or Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment or Project Certificate for Payment previously issued, to such extent as may be necessary in the Construction Manager's or Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from the acts and omissions described in Section 3.3.2 because of

- **.1** defective Work not remedied;
- **.2** third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- **.3** failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- **.4** reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- **.5** damage to the Owner or a Separate Contractor or
- **.6** failure to carry out the Work in accordance with the Contract Documents.
- **.7** reasonable evidence that the Work will not be completed within applicable Project milestones otherwise within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- **.8** failure to comply with government statutes, regulations and laws;
- **.9** failure to submit Prevailing Wage Certifications as required;

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.10 in the event that the Owner provides insurance in accordance with Article 11 of this Contract, failure to comply with the Project Insurance Manual procedural requirements including, but not limited to enrollment, payroll reporting and audit, and claim administration; or

.11 failure to comply with Project Safety & Health Management Plan Requirements as set forth in the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.2.1 If the Contractor disputes any determination by the Construction Manager or the Architect with regard to any Certificate of Payment, the Contractor nevertheless expeditiously shall continue to prosecute the Work.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect or Construction Manager withholds certification for payment under Section 9.5.1, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Construction Manager, and both will reflect such payment on the next Certificate for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment or Project Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Construction Manager and Architect. Such payment by the Owner shall not constitute approval or acceptance of any item of cost in the Application for Payment. No partial payment made hereunder shall be or be deemed to be final acceptance or approval of that portion of the Work to which such partial payment relates or relieve the Contractor of any of its obligations hereunder with respect thereto .

§ 9.6.2 The Contractor shall pay each Subcontractor and supplier, no later than twenty (20) business days after receipt of payment from the Owner, the amount to which the Subcontractor or supplier is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner. Each Contractor and each Subcontractor shall comply with the Pennsylvania Prompt Payment Act, 73 P.S. § 501 et seq., as applicable to public school construction projects. Nothing herein shall be deemed to waive or limit any rights or remedies available under applicable Pennsylvania law.

§ 9.6.2.1 The Contractor shall, at the request of the Owner, the Construction Manager, or the Architect, prior to the submission of an Application for Payment, submit an affidavit signed by the Contractor, Subcontractors', manufacturers and/or suppliers that they have been paid for their portion of the Work from previous Applications for Payment such Subcontractors, manufacturers and/or suppliers have performed Work.

§ 9.6.3 The Construction Manager may, on request, furnish to a Subcontractor or supplier, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Owner, Construction Manager and Architect on account of portions of the Work done by such Subcontractor or supplier.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven calendar days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner, Construction Manager nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

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§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents. Issuance of a Certificate for Payment by the Architect, payment on the Contract Sum or in reducing any retaining amount, or any use or occupancy of the Work shall not relieve the Contractor of its the obligations under the Contract Documents, including warranty of the Work. At any time the surety shall have the right to examine the status of the Work, as well as any payments .

§ 9.6.7 Payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner, Architect, and Construction Manager from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If through no fault of the Contractor the Owner does not pay the Contractor the amount certified by the Construction Manager and Architect within 21 calendar days after the date established in the Contract Documents then the Contractor may, upon 14 additional calendar days' notice to the Owner, Construction Manager and Architect, stop the Work until payment of the undisputed amount owing has been received. The Contract Time shall be extended for the amount of time the Contractor stopped Work. Contractor shall not stop work or terminate this Agreement if the Architect or Construction Manager should refuse to issue a Certificate of Payment because the Application for Payment does not conform with the requirements of the Contract Document.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents, and the local authorities having jurisdiction have issues a temporary or final Certificate of Occupancy, so the Owner can occupy or utilize the Work for its intended use. In general, the only remaining Work shall be minor in nature, so that the Owner can occupy the building or major area thereof on that date and the completion of the Work by the Contractor would not materially interfere with or hamper the Owner's normal operations. Contractor recognizes that 'normal operations' require the use and occupancy of the Work by the public, students, and Owner's staff without interruption and that any punchlist or corrective work shall be done at times when the Work is not so occupied unless otherwise permitted by Owner.

§ 9.8.1.1 The Date of Substantial Completion will be established after Substantial Completion inspection and the Architect's and Construction Manager's inspection and concurrence that the Work has achieved Substantial Completion.

§ 9.8.1.2 For Substantial Completion to occur for the Contractor, the following conditions shall be met:

- **.1** All of the Project parts and systems are accessible, operable and usable by the Owner, including the site work, HVAC systems, plumbing, electric, and Life Safety Systems, and commissioning of such systems has been successfully completed.
- **.2** The Project is clean, as defined elsewhere in the Contract Documents.
- **.3** Operation and maintenance manuals have been submitted to the Architect through the Construction Manager.
- **.4** Training of the Owner's personnel has taken place as required elsewhere in the Specifications.
- **.5** Annotated Record Drawings have been submitted to the Architect through the Construction Manager.
- **.6** All Federal, State and local authorities having jurisdiction over the Project have issued the requisite occupancy permits and/or approvals so that the Owner can occupy or utilize the Work for its intended purpose.

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§ 9.8.1.3 There will be a phased completion date for each phase to account for and address retainage reduction for select phases of the Project agreed to by the Contractor with the Construction Manager and Architect in accordance with the specific milestone completion dates where Owner takes beneficial use of certain designated phases. The conditions of phased completion shall be similar to those stated for Substantial Completion of the entire Project except that the warranty will not begin. Warranties will begin only at Substantial Completion of the entire Project.

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall notify the Construction Manager, and the Contractor, Architect, and Construction Manager shall jointly prepare a comprehensive list of items to be completed or corrected to achieve Final Completion. The punchlist shall be assembled in the web-based project management software. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 If the Architect's inspection discloses any item, whether or not included on the list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect, assisted by the Construction Manager, to determine Substantial Completion. If more than one inspection for Substantial Completion is required, the Contractor will be billed and responsible for the professional fees and services of the Architect and/or Construction Manager for performing all subsequent inspections .

§ 9.8.4 When the Architect, assisted by the Construction Manager, determines that the Work of all of the Contractors, or designated portion thereof, is substantially complete, the Construction Manager will prepare, and the Construction Manager and Architect shall execute, a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof upon certification by Architect that retainage is due to Contractor. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.8.5.1 Inspections for Substantial Completion will be conducted only at the completion of the Project or a scheduled phase of the Project. Such inspection will take place only when all Prime Contractors are complete with the Project or that scheduled phase of the Project. Any items to be completed or corrected that remain on the punchlist shall have a value of 150% of the cost affixed to them. Construction Manager, after consultation with the Architect, will provide the valuation. Such amount shall be retained from payments and held until the items are completed or corrected to the satisfaction of the Architect.

§ 9.8.5.2 In no event shall the Project or portion thereof be certified as substantially complete until at least 90% of the work on the Project, or portion thereof, is complete.

§ 9.8.5.3 Minimum Completion Threshold.
The percentage of completion requirement stated in Section 9.8.5.2 establishes a minimum condition precedent to consideration of Substantial Completion and does not replace or supersede the functional and operational criteria set forth in Section 9.8.1, all of which must be satisfied for certification of Substantial Completion.

§ 9.8.6 In no case shall the time established for the completion and correction of items on the list extend beyond 30 calendar days after certification of Substantial Completion, except for delay beyond the Contractor's control. The Contractor shall pay for all architectural and consultant services incurred thereafter due to the failure of Contractor to complete and/or correct Work on the list or to submit documentation and items required for Final Completion and

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Final Payment. Such costs may be back charged to Contractor and deducted from any existing retainage or subsequent Application for Payment

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall notify the Construction Manager as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect after consultation with the Construction Manager. Contractor shall not withhold partial occupancy or use from Owner due to failure of the Contractor to complete the Work in accordance with the Contract Documents in the time stipulated in the Agreement and approved Change Orders, if any, for extension of time.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Construction Manager, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.9.4 As Work is completed and occupied, the Contractor shall ensure the continuing construction activities will not unreasonably interfere with the use, occupancy and quiet enjoyment of the completed portions thereof.

§ 9.9.5 The Contractor agrees to coordinate the Work with the Construction Manager, the Architect, and the Owner in order to minimize disturbance to occupied portions of the structure. In the event performances or tests are conducted in close proximity to the Work in progress, the Contractor agrees to cease all Work which may disturb the Owner's occupants.

§ 9.9.6 The Owner shall have the right to occupy and erect or place any apparatus or equipment in any part of the Project without such installation being construed as an acceptance of any of the Contractor's workmanship or materials, or as affecting any terms in the Contract. Prior, however, to the Owner taking possession, an inspection will be made by the Construction Manager, Architect, and Owner of the area and any subsequent damage due to occupancy by the Owner will not be the responsibility of the Contractor.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon completion of the Work, the Contractor shall forward to the Construction Manager a notice that the Work is ready for final inspection and acceptance, and shall also forward to the Construction Manager a final Contractor's Application for Payment. Upon receipt, the Construction Manager shall perform an inspection to confirm the completion of Work of the Contractor. The Construction Manager shall make recommendations to the Architect when the Work of all of the Contractors is ready for final inspection, and shall then forward the Contractors' notices and Application for Payment or Project Application for Payment, to the Architect, who will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed ("Final Completion"), the Construction Manager and Architect will promptly issue a final Certificate for Payment or Project Certificate for Payment stating that to the best of their knowledge, information and belief, and on the basis of their on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Construction Manager's and Architect's final Certificate for Payment or Project Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

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§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect through the Construction Manager (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) final "as-built" prints of record drawings marked by the Contractor with record information as set forth in the Contract Documents, (7) a final Contractor's sworn statement showing all Subcontractors and material and equipment suppliers to be fully paid and similar sworn statement from Subcontractors and Sub-Subcontractors confirming that they have been paid, and (8), other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Construction Manager and Architect so confirm, the Owner shall, upon application by the Contractor and certification by the Construction Manager and Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect through the Construction Manager prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.3.1 If more than one inspection for Final Completion is required, the Contractor will be billed and responsible for the professional fees and services of the Architect and/or Construction Manager for performing all subsequent inspections. Following Substantial Completion, in the event the Contractor or Subcontractor fails to complete the list of items of the Work instructed by the Architect or Construction Manager to be corrected or completed within the time period set forth elsewhere in the Contract Documents or if no such time period is set forth elsewhere in the Contract Documents, then 30 calendar days from Substantial Completion, the Owner may: (i) exercise any available remedies to correct or complete deficient Work or retain a third party to correct or complete such Work at the cost of the Contractor; (ii) retain and deduct from any payments or retention otherwise due to the Contractor any fees and expenses for services required to be provided by the Architect and/or Construction Manager; and/or (iii) recover against the Contractor and Surety under the Performance Bond, as part of its damages any and all legal fees and professional fees, jointly and severally, and all other costs and expenses incurred by the Owner in connection with the Owner's pursuit of its rights under the Contract and Performance Bond, including, but not limited to, any and all legal fees, professional fees, and all other costs and expenses related thereto. The Owner shall have the right to set off said amounts against any amount alleged to be due and owing to the Contractor under the Contract.

§ 9.10.4 The making of final payment shall not constitute a waiver of Claims by the
(Paragraphs deleted)
Owner.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously asserted in a timely matter and in accordance with the Contract Documents and specifically identified in writing as unsettled at the time of final Application for Payment.

§ 9.11 Liquidated Damages

§ 9.11.1 Actual damages for delay in the time of completion are impossible of determination, thus liquidated damages will apply for each delay. The Contractor and Contractor's Surety shall be jointly and severally liable for, and shall pay the Owner the cost of expenses incurred by the Owner resulting from the Contractor's delay in completing the Work of the Contract within the Contract Time, as liquidated damages, but not as a penalty, in the amounts listed

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below, for each calendar day (Sunday and holidays included) of delay from the Project milestone dates, the phased completion dates, and the substantial completion date for the entire Project until the Work is substantially complete (as defined in Articles 8 and 9.8) at each phase, milestone of construction, subject to adjustments of the Contract Time as provided in the Contract Documents.

Site & Athletics Improvements Contract	$2,000 per day
General Construction Contract	$2,000 per day
All other Contracts	$1,000 per day

In the event the Contractor or Surety litigates the validity of this provision or the assertion of liquidated damages, the Contractor and Surety, jointly and severally, shall also be liable for legal fees, professional fees, costs, other expenses and/or damages incurred by the Owner. This liquidated damages provision applies to each phase and milestone of construction as well as the Substantial Completion date for the entire Project. Owner's right to receive liquidated damages shall be in addition to all other rights and remedies available to the Owner at law or in equity.

§ 9.11.2 If any other Prime Contractor shall be responsible, in the opinion of the Construction Manager and Architect, for delay in the time of completion of the Work of the Contractor then the Prime Contractor so determined to be responsible shall be liable for and shall pay to the Owner all liquidated damages otherwise attributable to the Contractor, as well as any legal fees, professional fees, or other costs or expenses incurred by the Owner.

§ 9.11.3 The Owner shall have the right to deduct the total amount of liquidated damages for which the Contractor may be liable under this Article from any payments then or thereafter due the Contractor. The Surety upon the Contract Bonds furnished by the Contractor shall be liable for any fixed, agreed, and liquidated damages for which the Contractor may be liable under this Section to the extent that the Contractor shall not make settlement thereof with the Owner.

§ 9.11.4 In addition to the Liquidated Damages established in this Section 9.11, the Contractor agrees to pay all associated costs for the Construction Manager and Architect to extend their Contract to remain on the Project due to the failure of the Contractor to complete the Work within the time frame stipulated in the Project Schedule. Damages to other Prime Contractors due to the extension of this Project duration shall be pursued in accordance with Article 6 of these General Conditions of the Contract.

§ 9.11.4.1 The determination of these costs will be based on the level of completion of the Work by the Contractor.

§ 9.11.4.2 Should a single Prime Contractor fail to complete the Project within the time frame stipulated, that sole Contractor shall be responsible for all costs listed in Section 9.11.4.

§ 9.11.4.3 Should more than one Prime Contractor fail to complete the Project within the time frame stipulated, the costs will be divided and apportioned proportionally to the level of completion of the Work and the value of the separate Prime Contractor's Contract Sum weighted against the total Project cost of all separate Prime Contracts.

§ 9.11.5 Liquidated damaged for failure to correct "punchlist" items shall be calculated at the following rates for each calendar day of delay beyond 30 calendar days after certification of Substantial Completion or phased completion until Work for corrections is complete.

Each Prime Contract	$500 per day

§ 9.11.6 Coordination of Liquidated Damages

Liquidated damages provided in Articles 3 and 9 address separate and independent Contractor obligations. Administrative liquidated damages imposed for specific performance failures shall apply independently from schedule based liquidated damages arising from failure to achieve milestone or completion dates.

Where multiple obligations are concurrently breached, applicable liquidated damages may be assessed concurrently. Nothing herein shall be construed to convert liquidated damages into penalties or to alter the intent of the parties that such amounts represent reasonable pre estimates of damages.

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ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall submit the Contractor's safety program to the Construction Manager for verification that the Contractor has a safety programs within 10 business days after Notice to Proceed. The Construction Manager's responsibilities for verification of safety programs shall not extend to any review of the adequacy of the Contractor's safety program, or control over or charge of the acts or omissions of the Contractors, Subcontractors, agents or employees of the Contractors or Subcontractors, or any other persons performing portions of the Work.

§ 10.1.1 The Contractor's safety program shall reference Federal and State OSHA standards and other rules and regulations applicable to construction activities on the Project. The Contractor's Project Safety and Health Program shall include, without limitation, as a minimum, the following:

§ 10.1.1.1 New Hire Safety and Orientation Program: Each new or reassigned employee of the Contractor shall receive a thorough safety orientation including, without limitation, employer/employee responsibilities under Federal and State OSHA regulations, ear protection in high noise level areas, respiratory protection, Safety Data Sheets (SDS), fire protection, first aid facilities, and look out procedures on electrical equipment.

§ 10.1.1.2 The Contractor shall furnish Safety Data Sheets (SDS) to the Construction Manager for all materials used on the Project in accordance with governmental requirements. The Contractor shall maintain one complete set of SDS for all materials used on the Project site for periodic inspection by the Owner and the Construction Manager. The SDS may be in hardcopy or electronic format, provided electronic access to the SDS does not create a barrier to access the documents. The Contractor shall be responsible for continually updating their SDS information on site and provide the Construction Manager with any revisions to the SDS. The Contractor shall be responsible for compliance with OSHA and the Hazard Communications Standard.

§ 10.1.1.3 Weekly Toolbox Safety Meetings: The Contractor shall conduct Weekly Toolbox Safety Meetings to provide employees with current safety information. Attendance is required and records must be kept on file in the Contractor's office for review.

§10.1.2 Safety

§10.1.2.1 Without limiting any other provisions regarding safety in the Contract Documents or under law, the Contractor shall take reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury, or loss to employees on the Work and other persons who may be affected thereby, and the Work and materials and equipment to be incorporated therein, with respect to the Work. The Contractor shall comply with all applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury or loss, specifically including all measures necessary and as may be required to comply with the Guidance and Directives from the Commonwealth of Pennsylvania, the Centers for Disease Control and Prevention (CDC), and any other governmental agency, relating to and arising from the COVID-19 pandemic. The Contractor acknowledges and agrees that the Guidance and Guidelines referenced herein may be revised and updated from time to time, and Contractor agrees to comply with any such revisions and updates.

§10.1.2.2 If applicable and when requested by the Owner, Construction Manager, or Architect, the Contractor agrees to submit to Owner a copy of Contractor's written plan for complying with the Guidelines and Guidance Documents referenced herein, including safe-distancing measures and other mitigation measures to protect the health and safety of Contractor's employees and the general public, as well as the Directive(s) of the Pennsylvania Governor, as may be updated from time to time. Submission of the plan to Owner shall not impose upon or establish for Owner any responsibility or obligation for Contractor's work environment or work-site safety, as such responsibility and obligation is solely upon the Contractor.

§ 10.1.2.3 Safety and Health Regulations for Construction

The Contractor shall be fully informed of and shall comply with all local, state, and federal regulations for construction as amended to date, as the rules and regulations in detail apply for the Work under the Contract. All applicable rules and regulations of governing bodies are hereby made a part of these General Conditions by reference, as if written out in full within.

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§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

.1 employees on the Work, the Owner's employees, representative, and building occupants, and other persons who may be affected by the Work or the Contractor's operations;

.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor;

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction; and

.4 construction or operations by the Owner, Separate Contractors, or other Prime Contractors, Subcontractors, or Sub-subcontractors;

.5 Contractor will comply with requirements of Exhibit B: Project Safety And Health Management Plan, When OCIP is implemented by Owner.

§ 10.2.2 The Contractor shall comply with, and give notices or reports required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss. If the Contractor fails to give such notices, or fails to comply with such laws, statutes, ordinances, codes, rules, regulations, and lawful orders of public authorities, Contractor shall be liable for and shall indemnify, defend, and hold harmless Owner, Architect, and Construction Manager, and their respective employees, officers and agents, against any resulting fines, penalties, judgments, or damages, including reasonable attorney's fees imposed on or incurred by the parties indemnified hereunder.

§ 10.2.2.1 The Contractor shall comply with Pennsylvania Act 187 of 1996 to call Pennsylvania One Call System, Inc. (800) 242-1776 prior to digging, excavating, or moving earth on the Project. The Contractor shall contract for the services of a qualified agency to assist in locating utilities on site not covered under Pennsylvania One Call System, Inc.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards. The Contractor shall also be responsible, at the Contractor's sole cost and expense, for all measures necessary to protect any property adjacent to the Project and improvements therein. Any damage to such property or improvements shall be promptly repaired by the Contractor.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall provide reasonable notice to the Owner and Construction Manager and exercise utmost care and carry on such activities under supervision of properly qualified personnel. Any Work approved must be in strict compliance with state and local regulations.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2, 10.2.1.3 and 10.2.1.4. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner, Construction Manager or Architect or anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable, and not attributable to the fault, acts, omissions or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner, Construction Manager and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site, or adjacent site, to be loaded so as to cause damage or create an unsafe condition.

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§ 10.2.7.1 The Contractor shall provide and maintain in good operating condition suitable and adequate fire protection equipment and services and shall comply with all reasonable recommendations of the fire insurance company carrying insurance on the Work or by the local fire chief or fire marshal. The area within the site limits shall be kept orderly and clean, and all combustible rubbish shall be promptly removed from the site.

§ 10.2.7.2 The Contractor shall at all times protect excavations, trenches, buildings, and materials from rainwater, ground water, back up or leakage of sewers, drainage or other piping, and from water of any other origin, and shall remove promptly any accumulation of water from the Project site. Contractor shall provide and operate all pumps, piping and other equipment necessary to this end.

§ 10.2.7.3 The Contractor shall remove snow or ice from the Project site which may result in damage or delay.

§ 10.2.7.4 The Contractor shall take all precautions necessary to prevent loss or damage caused by vandalism, theft, burglary, pilferage, or unexplained disappearance of property of the Owner, whether forming part of the Work or located within those areas of the Project to which the Contractor has access. The Contractor shall have full responsibility for the security of such property of the Owner located in such areas and shall reimburse the Owner for any such loss, damage, or injury, except such as may be directly caused by agents or employees of the Owner.

§ 10.2.8 Injury or Damage to Person or Property

If the Contractor suffers injury or damage to person or property because of an act or omission of another party, written notice of the injury or damage, whether or not insured, shall be given to the Owner and Construction Manager within a reasonable time not exceeding 21 calendar days after first observance, otherwise, such claim shall be deemed waited by the Contractor. The notice shall provide sufficient detail to enable the other party to investigate the matter. The Owner shall not be responsible for actions or inactions of other Prime Contractors or their Subcontractors.

§ 10.2.9 The Contractor shall comply with all requirements of the Project Safety & Health Management Plan Project Requirements included in the Contract Documents, and the Contractor's own safety plan in addition to all Federal/OSHA requirements.

§ 10.3 Hazardous Materials

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a hazardous material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed consultant to verify the presence or absence of the hazardous material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. When the hazardous material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately.

§ 10.3.3 To the extent covered by the Owner's applicable insurance policies, the Owner shall indemnify, defend, and hold harmless the Contractor, Subcontractors, Construction Manager, Architect, their consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if, and only if, in fact the hazardous material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless by the Owner after receipt of notice from Contractor of the same, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity or a party other than the Owner.

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§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 Intentionally deleted.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act to prevent threatened damage, injury, or loss and shall immediately notify the Owner, Construction Manager, Architect, and appropriate public safety authorities (i.e., police, EMS, fire service, etc.). Extensions of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Insurance Provided by Owner

§ 11.1.1 Except as otherwise provided in this Contract, prior to issuance of the Notice to Proceed under this Contract, Owner shall, at its sole cost and expense, secure and hereafter maintain insurance of the type and in the limits set forth below. To the extent that the Contractor, Subcontractor, or the property of such persons or entities, are covered by such insurance, (i) the Contractor shall comply and shall require its Subcontractors to comply with the terms set forth in this Section 11.1 and with the most current version of the Project Insurance Manual issued and maintained by the Owner and (ii) the Contractor shall exclude, and shall require its Subcontractors to exclude, the cost and expense of maintaining duplicative insurance coverage in the Cost of Work.

§11.1.2 Except as otherwise specified in this Contract, Owner shall purchase and continuously maintain until Substantial Completion or termination of this Contract, whichever occurs first, Builder's Risk. Such insurance shall cover all equipment, machinery, supplies and other property intended to be permanently incorporated in the Project, for which title or risk of loss shall have passed at the time of loss to an Insured. Coverage shall apply to such property while it is located at the Project Site or located at temporary off-site storage or staging areas approved by the Owner and its representatives, or while in land-based transit to the Project Site and within the continental United States. Coverage shall be written on a Builders Risk form, including but not limited to, fire, lightning, windstorm, hail, riot, riot attending a strike, civil commotion, aircraft, vehicle, smoke, explosion, vandalism, malicious mischief, damage to glass, theft, flood and earthquake (including sinkhole) coverages, subject to policy provisions, limitations, deductibles and exclusions. Limits under this insurance shall not be less than One Hundred Per Cent (100%) of the Replacement Value of the Project for physical damage to property and related expenses, provided that sub-limits shall be established for losses due to earthquake (including sinkhole) and for losses due to flood, which earthquake and flood sub-limits shall be no less than the minimum sub-limits for such losses established pursuant to Owner's agreements with lenders. The following sublimits will also apply:

Coverage	Sublimit
Transit	$1,000,000
Offsite Storage	$1,000,000
Equipment Breakdown	Included
Protection of Property	Included (Direct and Imminent Loss)
Ordinance or Law/Demolition & Increased Cost of Construction	Blanket Limit
Soft Costs/Delay in Completion	$1,000,000
Terrorism (TRIPRA)	Included – as provided by the current version of the Terrorism Risk Insurance Program Reauthorization Act
Earthquake	$1,000,000
Flood	$1,000,000

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§11.1.2.1 Owner and contractor waive all rights against (i) Each other and the subcontractors, agents and employees of each other and (ii) Subcontractors, agents and employees, for damages caused by fire or other peril to the extent covered by the Builders Risk insurance obtained.

§11.1.2.2 The Owner is the Named Insured on the Builders Risk policy. Contractor shall report Builders Risk claims to the Owner or Owner's Representative and the Owner or their Representative will file the insurance claim with the insurance carrier. Builders' Risk Insurance shall include as Additional Insured, the Owner, Contractor, and Subcontractors of all tiers performing Work at the Project site.

§11.1.3 Each Contractor and Subcontractor shall be responsible to pay the Builder's Risk policy deductible. If the claim, however, is caused by the School District or another Contractor/Subcontractor, the negligent party will be held responsible for the deductible payment. If the negligent party is not the School District or another Contractor/Subcontractor, each Contractor and Subcontractor shall be responsible to pay the Builder's Risk policy deductible. Payment towards the Builder's Risk deductible will not exceed $10,000 per occurrence and will be shared in proportion to direct loss.

§11.1.4 Unless otherwise provided in the Contract Documents, this property insurance shall cover portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also portions of the Work in transit.

§11.1.5 Loss, if any, under this Builder's Risk insurance shall be adjusted with Owner, Lenders, and/or Trustees, with the cooperation of Contractor and Subcontractors. Insurance proceed checks shall be made payable to the Owner or its Lenders or Trustees. Amounts shall be disbursed, when and if appropriate, to the Contractor or Subcontractors through the Change Order procedures described in this Contract.

§11.1.6 Except as otherwise specified in this Contract, the Owner shall maintain an Owner Controlled Insurance Program, referred to herein as OCIP, with Owner, Contractor and Subcontractors of all tiers, and such other persons or interests as the Owner may designate, as Insured parties, with limits not less than those specified below for each coverage. The OCIP coverage shall not apply to vendors, suppliers, truckers and material dealers; to other subcontractors who are solely engaged in the stocking, testing, transporting, picking up, delivering or carrying materials, parts, equipment or any other items or persons to or from the Project Site; to Contractors and Subcontractors who furnish material worked to a special design in accordance with the Drawings and Specifications but who perform no operations at the Project Site, unless required by Owner in writing; to surveyors, consultants, testing agencies, office/mailer suppliers, water and sewage removal suppliers, janitorial services and temporary fencing firms; or to employees who are temporarily at the Project Site for meetings, deliveries or similar activities. Asbestos Abatement and Hazardous Remediation Contractors are not covered by the OCIP (Workers' Compensation coverage, however, may be extended to roofing contractors who self-perform incidental asbestos removal work upon request and approval of the insurance carrier). Contractors and Subcontractors performing work with explosives are not covered by the OCIP for that portion of their work. Contractors and Subcontractors performing traffic work not directly connected to the Owner's site are not covered by the OCIP for that portion of their work. OCIP coverage for any Contractor or Subcontractor requires the written determination of enrollment of the applicable Contractor or Subcontractor by Owner. Owner may, in its sole discretion, and at any time prior to or during the performance of Work by a Contractor or Subcontractor, elect not to enroll or to cease an enrollment of the Contractor or Subcontractor of any tier.

§11.1.6.1 Workers' Compensation insurance for statutory benefit limits under Pennsylvania Workers' Compensation law, and Coverage B – Employer's Liability with minimum limits of One Million Dollars ($1,000,000) Each Accident for Bodily Injury by Accident, One Million Dollars ($1,000,000) Each Employee for Bodily Injury by Disease, and One Million Dollars ($1,000,000) Policy Limit for Bodily Injury by Disease for U.S. employees. Such insurance shall be endorsed to include Longshore and Harbor Workers Compensation Act Coverage and Jones Act Coverage, if applicable. The policy shall be endorsed to include "Other States Coverage." Coverage will apply only to Work performed at the Project Site and to incidental off-site activities directly related to Work performed at the Project Site. Coverage is not provided for off-site Work. Refer to 11.1.6 for specific exclusions of coverage for workers compensation.

§11.1.6.2 Commercial General Liability insurance, written on an Occurrence form shall be no less comprehensive and no more restrictive than the coverage provided by the standard Insurance Services Office (ISO) form CG 00 01 (12/07). Such insurance shall include by its terms or appropriate endorsements Bodily Injury, Property Damage,

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Personal Injury, Blanket Contractual, Independent Contractors, and Products and Completed Operations. This coverage shall have a minimum limit of Two Million Dollars ($2,000,000) Each Occurrence, Four Million Dollars ($4,000,000) General Aggregate per School District per Year, and Ten Million Dollars ($10,000,000) Products/Completed Operations Aggregate per year shared by all program enrollments. The Products/Completed Operations will provide a 12 Year Completed Operations Extension. During this extension period, the Product/Completed Operations will have one limit, will be shared with the latest annual policy period and will be shared by all program enrollments. Coverage will apply only to Work performed at the Project Site. Such insurance will not include coverage for products liability to any insured party, subcontractor, vendor, supplier, material dealer or others for any product(s) manufactured, assembled or otherwise worked upon away from the Project Site. The OCIP does not provide Professional Liability, Employment Related Practices Liability or Pollution Liability coverages. The OCIP policy excludes coverage for nuclear energy liability, blasting, mold, silica, asbestos, lead, EIFS and violation of communication statutes.

§11.1.6.2.1 If a Contractor and/or Subcontractor is responsible, in full or in part, for a General Liability claim that includes property damage, then the Contractor and/or Subcontractor will be responsible to pay towards the General Liability policy deductible.

§11.1.6.3 Umbrella Liability insurance. The Umbrella Liability program is Fifty Million Dollars ($50,000,000) Per Occurrence and Fifty Million Dollars ($50,000,000) Aggregate per School District per year. The Products/Completed Operations Aggregate is Fifty Million Dollars ($50,000,000), includes a 12-year Completed Operations Extension, and is shared by all program enrollments. Standard liability coverages are provided with similar exclusions as noted in 11.1.6.2.

§11.1.6.4 The coverage described in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3 are set forth in full in their respective policy forms, and the foregoing descriptions of such policies are not intended to be complete, or to alter or amend any provisions of the actual policies. In matters, if any, in which this description may conflict with such policies, the provisions of the policies shall govern.

§11.1.7 Prior to doing any of their work, each Contractor and Subcontractor must complete an Enrollment Application in accordance with the most current version of the Project Insurance Manual. Contractors and Subcontractors that fail to provide the completed Enrollment Application to the Program Administrator, Willis of Pennsylvania, Inc., prior to doing work at the site will be responsible for payment of associated Workers' Compensation premiums to their incumbent carriers

§11.1.8 Change Orders. Provided that the Owner is providing the coverages described in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3, the adjustment of the Contract Sum as contemplated in Sections 7.2 and 7.3 and its sub-psections shall be calculated and determined net of the insurance cost.

§11.1.9 The Contractor and Subcontractors shall provide and/or make available for audit any and all records reasonably needed by the Owner and/or its insurer(s) to calculate the premium properly that is to be paid by the Owner, as applicable. The Contractor and Subcontractors shall keep and maintain, in a professional manner, sufficient records as may be needed to properly calculate insurance premiums for all insurance that the Owner will provide under the terms of this Contract. The insurance carrier will perform physical audits at contractor's office location or require a self-audit mail for audit on an annual basis based on policy term.

§11.1.10 Notwithstanding anything herein to the contrary, the workers compensation and liability insurance policies and/or coverages provided by the Owner for/or on behalf of the Contractor or Subcontractors under this Agreement shall apply to any act or omission within the coverage of the policies and that occurs on or after the date of commencement of the Work as defined in the Agreement but prior to 60 days after the date of Substantial Completion by the Contractor or any Subcontractor as certified by the Architect in accordance with the terms of this Agreement. Notwithstanding anything herein to the contrary, the workers compensation and liability insurance policies provided by the Owner under this Agreement for/or on behalf of the Contractor or Subcontractors shall not apply to any act or omission occurring after 60 days after the date of Substantial Completion by the Contractor or any Subcontractor unless otherwise extended by Owner. The Contractor or any Subcontractor performing Work after 60 days after the date of their Substantial Completion shall be responsible for providing and maintaining in connection with said work all insurances required by Section 11.2 and its related subsections. The OCIP does not extend to Work under any implied or expressed warranty.

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§11.2 Contractor and Subcontractor Provided Insurance: The Contractor shall provide the following insurances and, upon request, supply proof of the following insurances to the Owner or its designee.

§11.2.1 Automobile Liability insurance covering all owned, non-owned, and hired vehicles used by Contractor and Subcontractors for all operations both on and off the Project Site, with a minimum limit of One Million Dollars ($1,000,000) Combined Single Limit Per Accident for Bodily Injury and Property Damage.

§11.2.2 Professional Liability insurance if Contractor (or applicable Subcontractors) will perform or retain others to perform professional services in connection with the Work, including engineering, architectural, medical, testing, environmental assessment or remediation, or design-build services, with a minimum limit of One Million Dollars ($1,000,000) Per Wrongful Act, Error, or Omission, and a minimum Two Million Dollars ($2,000,000) Annual Aggregate Limit.

§11.2.3 Owned and Non-Owned Aircraft. If an aircraft, whether owned or non-owned by the Contractor or any Subcontractor, is used in connection with the Work by the Contractor or any Subcontractor of any tier, the Contractor or Subcontractor, as applicable, shall advise the Owner or its representatives, shall provide a written explanation of the planned use of the aircraft, and shall provide Aircraft Liability Insurance at its sole cost and expense, the conditions and limits to be established by the Owner. The Owner reserves the right to prohibit the use of any aircraft in connection with the Work under this Contract. The minimum limit will be Five Million Dollars ($5,000,000). This insurance shall be primary to all other insurance.

§11.2.4 Asbestos and/or Lead Abatement. Asbestos and/or Lead Abatement Liability Insurance with limits of Ten Million Dollars ($10,000,000) Each Occurrence and Ten Million Dollars ($10,000,000) Aggregate when Work includes asbestos and/or lead abatement activities.

§11.2.5 Contractor shall provide Commercial General Liability insurance with minimum limits of Five Million Dollars ($5,000,000) Each Occurrence; Five Million Dollars ($5,000,000) General Aggregate and Five Million Dollars ($5,000,000) Products/Completed Operations. This coverage is primarily for off-site activities and for any other coverages the Contractor deems necessary and/or appropriate.

§11.2.5.1 Contractor shall provide Worker's Compensation insurance providing statutory limits under applicable state law and minimum limits under Coverage Part B (Employer's Liability) of Five Hundred Thousand Dollars ($500,000) for Each Accident for Bodily Injury by Accident, Five Hundred Thousand Dollars ($500,000) Each Employee for Bodily Injury by Disease, and Five Hundred Thousand Dollars ($500,000) Policy Limit for Bodily Injury by Disease. This coverage is for off-site activities and employees not covered by the OCIP.

§11.2.5.2 Insurance covering losses caused by Pollution incidents that arise from the operations of the Contractor. Insurance shall apply to bodily injury, property damage, including loss of use of damaged property or of property that has not been physically injured; cleanup costs and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims.

For Site & Athletics Improvements Contracts,	$1,000,000 per claim
Contractor's Pollution Liability:	$1,000,000 aggregate
For General, HVAC, Plumbing and Electrical Contracts,	$100,000 per claim
Contractor's Pollution Liability:	$100,000 aggregate

§11.2.6 Contractor Provided Insurance Resulting from Owners' Cancellation of OCIP or Exclusion of Contractor. Within seven (7) days of being notified that the Owner has elected to cancel the OCIP in accordance with Section 11.3.11 or has excluded a Contractor or Subcontractor of any tier in accordance with Section 11.1.6, Contractor shall submit a quote or proposal in writing to provide Workers' Compensation and General Liability insurance that meets the terms and conditions of the Contract Documents. The Contractor shall not bind or place such insurance unless instructed by the Owner through a Change Order. In the event the Owner does not provide such a Change Order to the Contractor, the Owner will continue to provide insurance through the OCIP in accordance with the Contract Documents. Any quote or proposal by the Contractor in accordance with this Section 11.2.6 shall be at the Contractor's actual cost of the additional insurance.

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§11.2.6.1 In the event that the Owner exercises its right to cancel the OCIP or exclude a Contractor, the Contractor shall then supply insurance for both on-site and off-site Work prior to the continuation of Work, the following provisions shall apply:

§11.2.6.1.1 Contractor shall provide, pay for and maintain (and shall require Subcontractors of all tiers to provide, pay for and maintain) insurance of the type and limits set forth below. Such insurance shall be maintained in full force and effect from the commencement of the Work by Contractor until final acceptance of the entire Project or the completion of all post-acceptance warranty or related Work by Contractor, whichever is later, and shall be for both on-site and off-site Work.

(Paragraph deleted)
§11.2.6.1.2 Automobile Liability insurance covering all owned, non-owned, and hired vehicles used by Contractor and Subcontractors for all operations both on and off the Project Site, with a minimum limit of One Million Dollars ($1,000,000) Combined Single Limit Per Accident for Bodily Injury and Property Damage.

(Paragraph deleted)
§11.2.6.1.3 Professional Liability insurance if Contractor (or applicable Subcontractors) will perform or retain others to perform professional services in connection with the Work, including engineering, architectural, medical, testing, environmental assessment or remediation, or design-build services, with a minimum limit of One Million Dollars ($1,000,000) Per Wrongful Act, Error, or Omission, and a minimum Two Million Dollars ($2,000,000) Annual Aggregate Limit.

(Paragraph deleted)
§11.2.6.1.4 Owned and Non-Owned Aircraft. If an aircraft, whether owned or non-owned by the Contractor or any Subcontractor, is used in connection with the Work by the Contractor or any Subcontractor of any tier, the Contractor or Subcontractor, as applicable, shall advise the Owner or its representatives, shall provide a written explanation of the planned use of the aircraft, and shall provide Aircraft Liability Insurance at its sole cost and expense, the conditions and limits to be established by the Owner. The Owner reserves the right to prohibit the use of any aircraft in connection with the Work under this Contract. The minimum limit will be Five Million Dollars ($5,000,000). This insurance shall be primary to all other insurance.

§11.2.6.1.5 Asbestos and/or Lead Abatement. Asbestos and/or Lead Abatement Liability Insurance with limits of Ten Million Dollars ($10,000,000) Each Occurrence and Ten Million Dollars ($10,000,000) Aggregate when Work includes asbestos and/or lead abatement activities.

(Paragraph deleted)
§11.2.6.1.6 Workers' Compensation insurance providing statutory benefit limits under Pennsylvania's Workers' Compensation law and minimum limits under Coverage Part B (Employer's Liability) of Five Hundred Thousand Dollars ($500,000) for Each Accident for Bodily Injury by Accident, Five Hundred Thousand Dollars ($500,000) Each Employee for Bodily Injury by Disease, and Five Hundred Thousand Dollars ($500,000) Policy Limit for Bodily Injury by Disease. The insurance shall cover all operations of Contractor (or the applicable Subcontractor). Such insurance shall be endorsed to include "Other States Coverage".

(Paragraph deleted)
§11.2.6.1.7 Commercial General Liability insurance covering all Operations/ Work of Contractor (or the applicable Subcontractor). Such insurance shall be written on an Occurrence form. Coverage shall not be provided under a "Claims-Made" or "Modified Occurrence" policy without the prior, expressed written consent of Owner. Such insurance: (i) Shall be no less comprehensive and no more restrictive than the coverage provided by the standard Insurance Services Office (IS0) form CG 00 01 (12/04); (ii) shall include by its terms or appropriate endorsements Bodily Injury, Property Damage, Personal Injury, Blanket Contractual, Independent Contractors, Products and Completed Operations coverages for 5 years; (iii) shall include Products Liability coverage for any products manufactured, assembled, or otherwise worked upon away from the Project Site; and (iv) shall include coverage for "x" (explosion), "c" (collapse), and "u" (underground) exposures. Such insurance shall have the following minimum limits:

For the Contractor:

$10,000,000 Each Occurrence;
$10,000,000 General Aggregate per Project; and

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$10,000,000 Products/Completed Operations Aggregate (5 Years)

For all Subcontractors:

$1,000,000 Each Occurrence;
$2,000,000 General Aggregate per Project; and
$1,000,000 Products/Completed Operations Aggregate (5 Years)

(Paragraph deleted)

§11.3 General Provisions Relating to Insurance

§11.3.1 All insurance required by this Contract shall be from insurance companies authorized to transact that class of insurance in the Commonwealth of Pennsylvania and having a minimum rating of (or equivalent to) A- VIII by A.M. Best & Company. When required, certificates must be personally and manually signed by the authorized representative of the insurance company shown on the certificate with proof that he/she is an authorized representative thereof and provided to the Owner's Representative as evidence of insurance required in accordance with Section 11.2 herein. In addition, certified, true and exact copies of all insurance policies required by this Contract shall be provided by Contractors and Subcontractors within a reasonable period of time upon written request.

(Paragraph deleted)

§11.3.2 All of the insurance provided by the Contractor, Subcontractors and Owner under the terms of this Contract shall provide primary coverage with respect to the Work, unless noted otherwise herein. Any other insurance maintained by Owner, Contractor, or Subcontractor shall be in excess of this insurance and shall not contribute to it.

§11.3.3 The issuing insurers will endeavor to provide thirty (30) Days written notice to the Owner and Contractor of any cancellation, intent not to renew, or reduction in the policies' coverage except in the application of the Aggregate Limit Provisions.

(Paragraph deleted)

§11.3.4 The insurance coverages and limits required under this Contract are designed to meet the minimum requirements of the Owner. They are not designed as a recommended insurance program for the Contractor or its Subcontractor; and meeting these minimum requirements does not relieve such persons or entities of their obligations under any other Section of this Contract. The Contractor shall not be prevented from acquiring, at its own expense, any other additional insurance coverage it deems necessary for the protection of its Work under the Contract.

§11.3.5 The amounts and types of insurance required by the Contract shall conform to the minimum requirements set forth in this Article 11, utilizing Insurance Services Office (ISO) policies and endorsements where applicable.

(Paragraph deleted)

§11.3.6 All of the insurance required by this Article 11 shall be issued as required by law and shall be endorsed, where necessary, to comply with the minimum requirements contained herein.

§11.3.7 Owner may elect at any time during the term of this Contract to require Contractor to procure and maintain other or additional insurance. Notice of such election shall be given at least Sixty (60) Days prior to the effective date of the required modifications. Any additional costs incurred by the Contractor or Subcontractors in securing said other or additional insurance shall be reimbursed by the Owner as part of the Cost of the Work, and the Contract Price shall be revised by Change Order to be increased by the amount of such additional cost.

(Paragraph deleted)

§11.3.8 Owner and Contractor waive all rights against (i) each other and the Subcontractors, agents and employees of each other and (ii) Subcontractors, agents and employees, for damages caused by fire or other peril to the extent covered by the Builder's Risk insurance obtained pursuant to Section 11.1.2 hereof, Commercial General Liability insurance obtained pursuant to Section 11.1.6.2 hereof, or Umbrella Liability insurance obtained pursuant to Section 11.1.6.3 hereof; except such rights as each may have to proceeds of such insurance held by any party to this Agreement or by any Subcontractor. The insurance policies obtained by Owner pursuant to this Article 11 shall include a waiver of subrogation in favor of the Contractor and Subcontractors and the insurance policies obtained by Contractor or Subcontractors pursuant to this Article 11 shall include a waiver of subrogation in favor of the Owner. Without limiting the generality of the foregoing, it is specifically agreed that there is and shall be no waiver of subrogation by Owner or Owner's other Property and Casualty insurer(s) for claims, damages, or losses of whatever nature or type that are insured by any insurance obtained either by Owner, the Contractor, or any Subcontractor of any

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tier pursuant to any of the provisions of this Agreement. In all events, any insurance obtained by the Owner, Contractor or any Subcontractor of any tier pursuant to this Agreement shall be primary and the policies possessed by Owner, Contractor or any Subcontractor of any tier for purposes of fulfilling the insurance obligations under this Agreement shall be written as primary.

§11.3.9 The Owner, the Architect and its Consultants, the Construction Manager and Construction Manager's consultants, the Clerk of the Works, municipalities having jurisdiction, applicable County Conservation District, and the PSBA Insurance Trust shall be named as Additional Insureds on all Contractor's insurance policies described herein except for worker's compensation. Coverage afforded to the Additional Insureds under said policies shall be primary to any insurance carried by the Additional Insureds.

(Paragraph deleted)
§11.3.10 Any and all returns of premiums, dividends, discounts or other adjustments to any OCIP policy is assigned, transferred and set over absolutely to Sponsor. This assignment is valid for insurance policies whose premiums have been paid by the Owner on behalf of Contractors and Subcontractors.

(Paragraphs deleted)
§11.3.11 Owner reserves the right to terminate or modify the coverages identified in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3 on Sixty (60) Calendar Days written notice to Contractor and Subcontractors of all tiers. To the extent that any coverage identified in Sections 11.1.6.1, 11.1.6.2 and 11.1.6.3 is so terminated or modified, or if and when Owner determines not to enroll or cease enrollment of a Contractor or Subcontractor of any tier in any of such coverages, then Contractor shall maintain or amend, and shall require its affected Subcontractors to maintain, its own policies of insurance as required in Section 11.3 of these General Conditions and its sub-sections to include coverage for all operations not included or no longer included in the coverage to be furnished by the Owner pursuant to Section 11.1 and its sub-sections. The actual cost of such alternative insurance which was originally identified as the quote for Insurance coverages of the applicable Contractor or Subcontractor will be reimbursed by Owner as a Change Order with the Contract Price or the pro-rata portion thereof, amended accordingly. Alternate Bids and Unit Prices will be adjusted in a similar fashion. Upon request, written evidence of such alternative insurance shall be provided to the Owner prior to the actual date of the termination or modification of the Owner-furnished insurance coverage, or promptly after Owner's determination of non-enrollment of a Contractor or Subcontractor in any such coverage.

(Paragraph deleted)
§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance
Intentionally deleted.

§ 11.5 Adjustment and Settlement of Insured Loss
§ 11.5.1 Intentionally deleted.

§ 11.6 Contractor's Performance Bond and Payment Bond.
The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents covering the Contractor's faithful performance of the Contract and payment of obligations arising thereunder. The Contractor shall purchase and maintain the required bonds from a company or companies acceptable to the Owner and lawfully authorized to issued surety bonds in the Commonwealth of Pennsylvania, and the cost thereof shall be included in the Contract Sum The amount of each Performance and Payment bond shall be equal to 100 percent (100%) of the Contract Sum. The forms contained in the Bidding Documents must be used. Other forms of bonds will not be accepted. The carriers from whom the Contractor has purchased bonds must be listed in the most recent U.S. Treasury Department Circular and authorized to conduct business in the Commonwealth of Pennsylvania with an AM Best Rating or "A-" or better and financial rating of Class "X" or higher.
The amount of said bonds in question must not exceed the acceptable limit in accordance with the ratings of the surety company. The Contractor shall provide bonds in accordance with the Public Works Contracts Bond Law of 1967, 8 P.S. Sec. 191, et seq. The bonds shall be solely for the protection of the Owner or its assignee. The Surety's liability under the bonds shall be the same as the Contractor's liability.

§ 11.6.1 The Contractor shall deliver the required Payment Bond and Performance Bond to the Owner not later than ten (10) days after receipt of Notice of Intent to Award.

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§ 11.6.2 The Contractor shall require the attorney-in-fact who executes the required Payment Bond and Performance Bond on behalf of the surety to affix thereto a power of attorney that is certified to be in full force and effect as of the date of the Bonds.

§ 11.6.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.7 If any party is damaged by the failure of the other to purchase or maintain insurance required under Article 11 and so notifies the other party, then the party who failed to purchase or maintain the insurance shall bear all reasonable costs properly attributable thereto.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Construction Manager's or Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by either, be uncovered for their examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Construction Manager or Architect has not specifically requested to examine prior to its being covered, the Construction Manager or Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense unless the condition was caused by one of the other Prime Contractors in which event the other Prime Contractor shall be responsible for payment of such costs.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

In addition to the Contractor's obligations under Section 3.5, if, within one year, or such longer period of time as set forth in the Bid, after the date of Substantial Completion or designate portion thereof, the Contractor shall promptly correct Work rejected by the Construction Manager, Owner or Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion, and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.1.1 Work that is rejected or fails to conform to the requirements of the Contract Documents that requires any review, research, recommendation, meetings or direction by the Architect, any other consultants, or the Construction Manager, in order to substantiate the same or to approve remedies or alternate solutions will be subject to Section 12.2.1. The Architect, any consultants, and the Construction Manager, will be compensated for such additional Work at the prevailing rates by the Owner, who will be entitled to back charge the Contractor for such fees, as well as any legal fees, professional fees, other expenses or costs incurred. The Owner may deduct the same from any Application for Payment or any amount of retainage.

§ 12.2.1.2 If prior to the date of Substantial Completion, the Contractor, a Subcontractor, or anyone for whom either is responsible uses or damages any portion of the Work, including, without limitation, mechanical, electrical, plumbing, and other building systems, machinery, equipment or other mechanical device, the Contractor shall cause such item to be restored to "like new" condition at no expense to the Owner.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner or Architect to do so, unless the Owner or Architect has previously given the Contractor a written acceptance of such condition. The obligations under Section 12.2.2 shall survive acceptances of the Work under the Contract and termination or expiration of the Agreement. The Owner or Architect

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shall give such notice promptly after discovery of the condition. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner, Construction Manager or Architect, the Owner may correct it in accordance with Section 2.5. Nothing contained in Section 12.2.2 shall decrease the liability of the Contractor and its Surety as set for the in the Performance Bond and/or as required by law.

§ 12.2.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2, but shall be extended with respect to portions of incomplete or defective Work noted on the Certificate of Substantial Completion.

§ 12.2.2.4 If the Contractor fails to correct nonconforming Work within a reasonable time, the Owner may correct it in accordance with Section 2.5. If the Contractor does not proceed with correction of such nonconforming Work within a reasonable time fixed by written notice from the Architect, the Owner may remove it and store the salvable materials or equipment at the Contractor's expense. If the Contractor does not pay costs of such removal and storage within 10 business days after written notice, the Owner may, upon 10 additional business days' written notice, sell such materials and equipment at auction or at private sale and shall account for the proceeds thereof, after deducting costs and damages that should have been borne by the Contractor, including compensation for the Architect's services and expenses made necessary thereby, and attorneys' and accountants' fees and expenses. If such proceeds of sale do not cover costs which the Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner. The Contractor shall bear the cost of any Work not performed or improperly performed by the Contractor .

§ 12.2.4 The Contractor shall bear the cost of correcting or addressing destroyed or damaged construction of the Owner, Separate Contractors, or other Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents, or the Contractor's failure to properly perform the Work.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.2.6 The obligations under Section 12.2 shall cover any repairs and replacement to any part of the Work or other property caused by the defective Work.

§ 12.2.7 The Contractor will be responsible for any expense of the Owner incurred by said uncovering or repair including, but not limited to, legal fees, professional fees, other expenses, or costs.

§ 12.2.8 Upon request by the Owner and prior to the expiration of 1 year from the date of Substantial Completion, the Architect, Construction Manager, and Contractor shall schedule and attend a meeting with the Owner to review the facilities operations and performance.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

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ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by Commonwealth of Pennsylvania without regard to conflicts of law The Contractor's attention is directed to the fact that all applicable Federal and State laws, codes, local ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the Project shall apply to the Agreement throughout, and they are deemed to be included in the Agreement the same as though herein written in full.

§ 13.1.1 The Contractor shall comply with all applicable laws of the Commonwealth of Pennsylvania, including the provisions of the Solid Waste Management Act (1980) and any amendments thereto and shall comply with applicable laws of the United States, along with all local laws and ordinances, and all environmental protection acts.

§ 13.1.2 Non-Discrimination Policies

.1 The provisions of the Pennsylvania Human Relations Act, Act 222 of October 27, 1955 (P.L. 744), as amended from time to time (43 P.S. Section 951, et. seq.) of the Commonwealth of Pennsylvania prohibits discrimination because of race, color, religious creed, ancestry, age, sex, hair, national origin, or non-job related handicap or disability or the use of a guide or support animal because of blindness, deafness, or physical handicap, by employers, employment agencies, labor organizations, contractors, and others. The Contractor shall agree to comply with the provisions of the Pennsylvania Human Relations Act, as amended from time to time, which are made part of these General Conditions as if included herein at length. The Contractor's attention is directed to the language of the Commonwealth of Pennsylvania's non-discrimination clause in 16 Pa. Code Section 49.101, et seq., as amended from time to time.

.2 By Submitting a bid and executing Contract Documents, the Contractor shall be deemed to agree as follows:

- **a.** In the hiring of any employee (s) for the manufacturer of supplies, performance of the Work, or any other activity required under the Contract or any subcontract, the Contractor, Subcontractor, or any person acting on behalf of the Contractor or Subcontractor shall not discriminate, by reason of gender, race, creed or color in violation of the Pennsylvania Human Relations Act (PHRA) and applicable federal laws against any citizen of the Commonwealth of Pennsylvania who is qualified and available to perform the Work to which the employment relates. (62 Pa. C.S.A. Section 3701).
- **b.** The Contractor, any Subcontractor, or any person on their behalf shall not in any manner discriminate by reason of gender, race, creed, color, sexual orientation, gender identity or expression, or in violation of the PHRA and applicable federal laws, against or intimidate any employee involved in the manufacturer of supplies, the performance of Work, or any other activity required under the Contract. (62 Pa. C.S.A. Section 3701).
- **c.** Neither the Contractor nor any subcontractor nor any person on their behalf shall in any manner discriminate against employees by reason of participation in or decision to refrain from participating in labor activities protected under the Public Employee Relations Act, Pennsylvania Labor Relations Act, or National Labor Relations Act, as applicable and to the extent determined by entities charged with such Acts' enforcement, and shall comply with any provision of law establishing organizations as employees' exclusive representatives.
- **d.** The Contractor and Subcontractors shall establish and maintain a written nondiscrimination and sexual harassment policy and shall inform their employees in writing of the policy. The policy must contain a notice that sexual harassment will not be tolerated and employees who practice it will be disciplined. Posting this Nondiscrimination/Sexual Harassment Clause conspicuously in easily accessible and well-lighted places customarily frequented by employees and at or near where the grant services are performed shall satisfy this requirement for employees with an established work site.
- **e.** The Contractor shall not discriminate by reason of gender, race, creed, color, sexual orientation, gender identity or expression, or in violation of the PHRA and applicable federal laws, against any Subcontractor or supplier who is qualified to perform the Work to which the Contracts relates.
- **f.** The Contractor and each Subcontractor represents that it is presently in compliance with and will maintain compliance with all applicable federal, state, and local laws and regulations relating to nondiscrimination and sexual harassment. The Contractor and each Subcontractor further represents that it has filed a Standard Form 100 Employer Information Report ("EEO-1") with the U.S. Equal Employment Opportunity Commission ("EEOC") and shall

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file an annual EEO-1 report with the EEOC as required for employers' subject to Title VII of the Civil Rights Act of 1964, as amended, that have 100 or more employees and employers that have federal government contracts or first- tier subcontracts and have 50 or more employees. The Contractor or any subcontractor shall, upon request and within the time periods requested by the Commonwealth, furnish all necessary employment documents and records, including EEO-1 reports, and permit access to their books, records, and accounts by the granting agency and the Bureau of Diversity, Inclusion and Small Business Opportunities, for the purpose of ascertaining compliance with the provisions of this Section 13.1.2.

g. The Contractor shall include, without limitation, the provisions of this Section 13.1.2 in every subcontract so that such provisions will be binding upon each Subcontractor.

h. The Contractors' obligations pursuant to these provisions are ongoing from and after the effective date of this Contract through the termination date thereof. Accordingly, the Contractor and Subcontractors shall have an obligation to inform the Owner and Commonwealth if, at any time during the term of this Agreement, it becomes aware of any actions or occurrences that would result in violation of these provisions.

i. The Owner, Commonwealth of Pennsylvania and its agencies may cancel or terminate the Contract for a violation of the terms and conditions of this Section 13.1.2, and all money due or to become due to the Owner under the Grant may be forfeited for a violation of the terms and conditions of this Section 13.1.2. In addition, the Commonwealth and its agencies may proceed with debarment or suspension and may place the Contractor and/or Subcontractor in the Contractor Responsibility File.

§ 13.1.3 Prevailing Wage Requirements

.1 The Pennsylvania Prevailing Wage Act (Act No. 442 of 1961, P.L. 987, amended by Act 342 of 1963, P.L. 653), and as amended from time to time (43 P.S. Section 165-1, et seq.), the regulations thereto, and the Prevailing Wage Determination Schedule included in the Contract Documents as Section 00 73 46, as determined by the Secretary of Labor and Industry (the "Secretary"), shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term therefore in the locality in which the Work is performed, are expressly incorporated in these General Conditions by reference.

.2 The provisions of the Davis-Bacon Act, as amended (40 U.S.C 3141-3148) are applicable to this project, and the regulations thereto and Prevailing Wage Determination Schedule, as determined by the US Department of Labor (the "Secretary") and included in the Contract Documents as Section 00 73 46, shall be paid for each craft or classification of all workers needed to perform the Contract during the anticipated term therefore in the locality in which the Work is performed, are expressly incorporated in these General Conditions by reference.

.3 The Contractor and Subcontractors shall pay no less than the wage rates (including contributions for employee benefits) as required by the Prevailing Wage Rate Requirements included in the Contract Documents as Section 00 73 43, to any person they respectively employ in the performance of the Work. Employers not parties to a contract requiring contributions for employee benefits which have been determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workers.

.4 The Contract provisions shall apply to all Work performed on the Contract by the Contractor and to all Work performed on the Contract by all Subcontractors. The Contractor shall insert into each subcontract all of the stipulations contained in these required provisions and such other stipulations as may be required.

.5 The Contractor and all Subcontractors shall keep an accurate record showing the time, craft and/or classification, number of hours worked per day, and the actual hourly rate of wage paid (including employee benefits) to each worker employed by them in connection with the Project and such record must include, without limitation, any deductions from each worker. The record shall be preserved for two (2) years from the date of payment, or as required by Section 3.6.5.1, and shall be open at all reasonable hours to the inspection of the Owner and to the Secretary or the Secretary's duly authorized representatives.

.6 The Contractor and each of its Subcontractors shall comply with the requirements of Specification Section 00 73 43, Prevailing Wage Rate Requirements, for the submission of Prevailing Wage Certification Forms required for this Project.

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§ 13.1.4 ALUMINUM AND STEEL PRODUCTS

.1 As this Project involves the construction, reconstruction, alteration, repair, improvement or maintenance of "public work", the Contractor shall strictly comply with all requirements of the Pennsylvania Steel Products Procurement Act, 73 P.S. Section 1881, et seq., as amended from time to time with respect to the Work, which shall include, without limitation, using steel, steel products (including machinery and equipment) or cast iron produced in the United States unless otherwise exempted therefrom in the performance of the Contract or any Subcontracts thereunder.

.2 "Steel products" are defined as products rolled, formed, shaped, drawn, extruded, forged, cast, fabricated or otherwise similarly processed, or processed by a combination of two (2) or more of such operations, from steel made in the United States by the open hearth, basic oxygen, electric furnace, Bessemer or other steel making process and shall include cast iron products, machinery and equipment listed in United States Department of Commerce Standard Industrial Classification 25 (furniture and fixture), 35 (machinery, except electrical) and 37 (transportation equipment) and made of, fabricated from, or containing steel components. If a product contains both foreign and United States steel, such product shall be determined to be a United States steel product only if at least seventy-five percent (75%) of the cost of the articles, materials and supplies have been mined, produced or manufactured, as the case may be, in the United States. Transportation equipment shall be determined to be a United States steel product if it complies with Section 165 of Public Law 97-424 (96 Stat. 2136).

.3 In accordance with Act 161 of 1982, cast iron products shall also be included and produced in the United States. Act 144 of 1984 (July 9, 1984 P.L. 674) further defines "steel products" to include machinery and equipment. Act 142 of 1980 (Oct. 5, 1980 P.L. 693), Act 161 of 1982 and Act 141 of 1984 provide clarifications and penalties and Contractor shall abide by these Acts, as amended from time to time.

.4 In addition to the requirements set forth in Section 13.1.5.1, the Contractor shall strictly comply with all requirements of the Trade Practices Act, 71 P.S. § 773.101 et seq., which shall include, without limitation, being prohibited from using any aluminum or steel products made in a foreign country which discriminates against aluminum or steel products manufactured in Pennsylvania. The countries of Brazil, South Korea, Spain, and Argentina have been found to discriminate against certain products manufactured in Pennsylvania. Therefore, the purchase or use of those countries' products, as listed herein, for the Project is strictly prohibited

.5 BRAZIL: Welded carbon steel pipes and tubes; carbon steel wire rods; tool steel; certain stainless-steel products, including hot-rolled stainless-steel bar; stainless steel wire rod and cold-formed stainless-steel bar; pre-stressed concrete steel wire strand; hot-rolled carbon steel plate in coil; hot-rolled carbon steel sheet and cold-rolled carbon steel sheets.

.6 SPAIN: Certain stainless-steel products, including stainless steel wire rod, hot-rolled stainless-steel bars and cold-formed stainless-steel bars; pre-stressed concrete steel wire strands, and certain steel products, including hot-rolled steel plate, cold-rolled carbon steel plate, carbon steel structural shapes, galvanized carbon steel sheet, hot-rolled carbon steel bars and cold-formed carbon steel bars.

.7 SOUTH KOREA: Welded carbon steel pipes and tubes; hot-rolled carbon steel plate; hot-rolled carbon steel sheet and galvanized steel sheet.

.8 ARGENTINA: Carbon steel wire rod and cold-rolled carbon steel sheet.

.9 Penalties for violation of the above Sections may be found in the Trade Practices Act, which penalties include becoming ineligible for public works contracts for a period of three years.

.10 The provisions of Section 13.1.5 in no way relieves the Contractor of responsibility to comply with those provisions of this Contract which prohibit the use of foreign-made steel and cast-iron products.

§ 13.1.5 Right to Know Law

The Contractor shall comply with all terms and conditions of the Pennsylvania Right to Know Act,, 65 P.S. § 67.101, et seq. ("RTKL"), and as amended.

.1 Upon notice given by Owner to Contractor that the Owner is in receipt of a Right-to-Know Request (the Request) requesting access to documents related to the Work that are not within the possession of the Owner or Owner's representatives, the Contractor shall provide Owner all documents regarding the Work that are determined by the Owner to be responsive to the Request (the "Record"). The Owner shall determine whether the Record constitutes a Public Record subject to disclosure under the RTKL.

.2 Upon receipt of a Request as described under Section 13.1.5.1, Owner will send a copy of the Request to the Contractor within five (5) business days of receipt of the Request for the Record. The Contractor shall provide the Owner with the Record within five (5) business days. The Contractor shall provide such other

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assistance as the Owner may need in order to comply with the RTKL. The Owner shall deny the Request for the Record or release the Record within the time period allotted by the RTKL.

.3 If at any time the Contractor notifies the Owner in a written statement signed by a representative of the Contractor that a document provided by the Contractor to the Owner contains a trade secret or confidential proprietary information, the Owner shall notify the Contractor within five business (5) days of receipt of a Request requesting a Record of the Contractor that contains such information. The Contractor shall have five (5) business days from the receipt of the notice from the Owner to provide input on the release of the Record. Thereafter the Owner will either deny the Request or release the Record and shall notify the Contractor of its decision.

.4 The failure by the Contractor to provide to the Owner the Record under Section 13.1.5.2 or the input under Section 13.1.5.3 within the specified time periods will be grounds for termination under Section 14.2. If the Owner denies the Request for failure of Contractor to provide the Record, and an appeal is taken from the denial, the Contractor upon demand from the Owner shall indemnify, and hold the Owner harmless from and against any damages, penalties, expenses, legal costs and fees, or other detriment or harm that the Owner may incur in connection with defense of the appeal. If on appeal, a final determination is entered by the Office of Open Records that requires the Owner to provide access to the Record, Contractor shall provide the Owner the Record in accordance with the final determination. Failure to timely provide the Record shall subject the Contractor to the payment of liquidated damages of $800 per day for each calendar day beyond the date the Record was ordered to be released.

.5 The Owner will provide the Contractor with reimbursement for costs incurred by Contractor for which Owner is allowed to charge in accordance with and within the scope of permitted costs as set forth in the fee schedule established by the Office of Open Records or as otherwise allowed under the RTKL.

.6 The Owner's determination as to whether the Record is a Public Record is dispositive of the question as between the Owner and the Contractor. The Contractor agrees not to challenge the Owner's decision or in any way hold the Owner liable for its decision. Contractor waives all rights or remedies that may be available to Contractor as a result of the Owner's disclosure of Records in response to a RTK Request. The waiver of all rights or remedies shall survive the expiration of the Contract Documents.

§ 13.1.6 Pennsylvania Uniform Construction Code

The Contractor shall comply with all requirements of the Pennsylvania Uniform Construction Code, 35 P.S. § 7210.301 – 7210.304, as amended by S.B. 1139, Session of 2004, as further amended from time to time.

§ 13.1.7 ANTI-POLLUTION LEGISLATION AND EROSION CONTROL:

.1 62 Pa. C.S.A. Section 3301 requires that Bidders on construction contracts, for the Commonwealth of Pennsylvania be advised that there are provisions of Federal and State statutes, rules and regulations dealing with the prevention of environmental pollution and the preservation of public natural resources that affect the Project on which Bids are being received.

.2 The Bidder shall become thoroughly acquainted with the terms of the listed statutes, rules and regulations, including, but not limited to, Flood Plain Management Act (32 P.S. Section 679.101, et seq.), Water Well Drillers License Act (32 P.S. Section 645.1, et seq.), Pennsylvania Scenic Rivers Act (32 P.S. Section 820.21, et seq.), Dam Safety and Encroachment Act (32 P.S. Sec. 693.1, et seq.), Bluff Recession and Setback Act (32 P.S. Section 5201, et seq.), Storm Water Management Act (32 P.S. Section 680, et seq.), Pennsylvania Sewage Facilities Act (35 P.S. Section 750.1, et seq.), Pennsylvania Solid Waste Management Act (35 P.S. Section 6018.101, et seq.), Pennsylvania Safe Drinking Water Act (35 P.S. Section 721.1, et seq.), the Clean Streams Law (35 P.S. Section 691.901 et seq. and 35 P.S. Section 691.1 et. seq.), Air Pollution Control Act (35 P.S. Section 4001, et seq.), Pennsylvania Historic Preservation Act (37 Pa. C.S.A. Section 501, et seq.), Pennsylvania Hazardous Sites Clean Up Act (35 P.S. Section 6020.101, et seq.), Pennsylvania Storage Tank and Spill Prevention Act (35 P.S. Sec. 6021.101, et seq.), Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. Sections 9601-9675) as amended, including, but not limited to, the Superfund Amendments and Reauthorization Act (P.L. 99-499), Federal Solid Waste Disposal Act (42 U.S.C. Sections 6901-6992), Federal Clean Air Act (Air Pollution Act) (42 U.S.C. Sections 7401-7671q), Federal Safe Drinking Water Act (See Public Health Service Act Sections 1401-1451) (42 U.S.C. Sections 300f-300j-11), Wild and Scenic River Act (P.L. 90-542), Endangered Species Conservation Act of 1969 (P.L. 89-669), Endangered Species Conservation Act of 1973 (16 U.S.C. Sections 1531-1544), Federal Clean Water Act of 1977 (P.L. 95-217), Rivers and Harbor Act of 1970 (P.L. 91-611), Federal Insecticide, Fungicide, and Rodenticide Act (7 U.S.C. Sections 136-136y), Toxic Substance Control Act (15 U.S.C. Sections 2601-2692), Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sections

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6901-6991), Coastal Wetlands Planning, Protection and Restoration Act (16. U.S.C. Sections 3951-3956), Coastal Zone Management Act of 1972 (16 U.S.C. Sections 1451-1464), Community Environmental Response Facilitation Act (42 U.S.C. Section 9620), Emergency Planning and Right-to-Know Act of 1986 (42 U.S.C. Sections 11001-11050), Energy Supply and Environmental Coordination Act of 1974 (15 U.S.C. Sections 791-798), Environmental Quality Improvement Act of 1970 (42 U.S.C. Sections 4371-4375), Federal Facility Compliance Act of 1992 (42 U.S.C. Section 6901), Federal Land Policy and Management Act of 1976 (43 U.S.C. Sections 1701-1784), Federal Water Pollution Control Act (33 U.S.C. Sections 1251-1387), Geothermal Energy Research, Development, and Demonstration Act of 1974 (30 U.S.C. Sections 1101-1164), Global Climate Protection Act of 1987 (15 U.S.C. Section 2901 note), Hazardous Substance Response Revenue Act of 1980 (see 26 U.S.C. Sections 4611, 4612, 4661, 4662), Lead-Based Paint Exposure Reduction Act (15 U.S.C. Sections 2681-2692), Lead Contamination Control Act of 1988 (42 U.S.C. Sections 300j-21 to 300j-25), Low-Level Radioactive Waste Policy Act (42 U.S.C. Sections 2021b-2021d), National Climate Program Act (15 U.S.C. Sections 2901-2908), National Contaminated Sediment Assessment and Management Act (33 U.S.C. Section 1271 note), National Environmental Policy Act of 1969 (42 U.S.C. Sections 4321-4370b), National Ocean Pollution Planning Act of 1978 (33 U.S.C. Sections 1701-1709), Noise Control Act of 1972 (42 U.S.C. Sections 4901-4918), Oil Pollution Act of 1990 (33 U.S.C. Sections 2701-2761), Pollution Prevention Act of 1990 (42 U.S.C. Sections 13101-13109), Public Health Service Act (42 U.S.C. Sections 300f-300j-11), Renewable Resources Extension Act of 1978 (16 U.S.C. Sections 1671-1676), Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sections 6901-6991), Soil and Water Resources Conservation Act of 1977 (16 U.S.C. Sections 2001-2009), Water Resources Research Act of 1984 (42 U.S.C. Sections 10301-10309), Wood Residue Utilization Act of 1980 (16 U.S.C. Sections 1681-1687), Pennsylvania Worker and Community Right-to-Know Act (35 P.S. Section 7301, et seq.), Asbestos Hazard Emergency Response Act of 1986 (see Toxic Substances Control Act Sections 201-214) (15 U.S.C. Sections 2651-2654), Delaware River Basin Compact (32 P.S. Section 815.101, et seq.), Brandywine River Valley Compact (32 P.S. Section 818, et seq.), Wheeling Creek Watershed Protection and Flood Prevention District Compact (32 P.S. Section 819, et seq.), Susquehanna River Basin Compact (32 P.S. Section 820.1, et seq.), Chesapeake Bay Commission Agreement (32 P.S. Section 820.11, et seq.), Land and Water Conservation and Reclamation Act (32 P.S. Section 5101, et seq.), Wild Resource Conservation Act (32 P.S. Section 5301, et seq.), Cave Protection Act (32 P.S. Section 5601, et seq.), Rails to Trails Act (32 P.S. Section 5611, et seq.), Phosphate Detergent Act (35 P.S. Section 722.1, et seq.), Plumbing System Lead Ban and Notification Act (35 P.S. Section 723.1, et seq.), Publicly Owned Treatment Works Penalty Law (35 P.S. Section 752.1, et seq.), Pennsylvania Solid Waste-Resources Recovery Act (35 P.S. Section 755.1, et seq.), Sewage System Cleaner Control Act (35 P.S. Section 770.01, et seq.), Hazardous Material Emergency Planning and Response Act (35 P.S. Section 6022.101, et seq.), Oil Spill Responder Liability Act (35 P.S. Section 6023.1, et seq.), Land Recycling and Environmental Remediation Standards Act (35 P.S. Section 6026.101, et seq.), Radiation Protection Act (35 P.S. Section 7110.101, et seq.), Low-Level Radioactive Waste Disposal Act (35 P.S. Section 7130.101, et seq.), Pennsylvania Municipalities Planning Code (53 P.S. Section 10101, et seq.), regulations, ordinances, and other actions pursuant to the foregoing, regulations pertaining to Pennsylvania Erosion and Sediment Control, and so on. No separate or additional payment will be made for such compliance. In the event that the listed statutes, rules and regulations are amended, or if new statues, rules or regulations become effective, after date of receipt of Bids, upon receipt of documentation which causes the Contractor to perform additional Work, the Owner may issue a Change Order setting forth the additional Work that must be undertaken and such additional Work shall be undertaken at no additional cost to the Owner. It is also the responsibility of the Contractor to determine what local ordinances, if any, will affect their portion of the Work. The Contractor shall check for any County, City, Borough or Township rules or regulations applicable to the area in which the Project is being constructed and, in addition, for any rules or regulations of other organizations having jurisdiction, including, without limitation, chambers of commerce, planning commissions, industries or utility companies who have jurisdiction over lands which the Contractor occupies. Any costs of compliance with local controls shall be included in the prices bid, even though documents of such local controlling agencies are not listed herein.

.3 Erosion Control

a. To the extent the Contractor performs excavation Work, it shall comply with all rules and regulations of Chapter 102, Title 25 of Pennsylvania Soils Erosion and Sedimentation Control (25 Pa. Code Section 102.1, et seq.). Prior to any grading, the Contractor shall be responsible to obtain approval from the Department of Environmental Protection and local Conservation District having jurisdiction for an approved sedimentation and erosion control site plan for the Project site and shall

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perform all necessary site work in accordance with said plan. The applicable plan shall be available at the Project site at all times. If the Contractor performs excavation work, it shall maintain all devices as required to control erosion caused by storing water and preventing dust and particles from being distributed off site.

b. Site Excavation: The Contractor shall:

1) request the location and type of facility owner lines at the Project site by notifying the facility owner through the One Call System as defined in 73 P.S. § 176. Notification shall be not less than three (3) business days nor more than ten (10) business days in advance of beginning excavation or demolition work. No work shall begin earlier than the scheduled excavation date which shall be on or after the third business day after notification. The scheduled excavation date shall exclude the date upon which notification was received by the One Call System and notification received on a Saturday, Sunday, or holiday, which shall be processed on the following business day. In the case of a complex project as defined in 73 P.S. § 176, notification shall not be less than ten (10) business days in advance of the beginning of excavation or demolition work.

2) provide the One Call System with specific information to identify the Project site so that facility owners might provide indications of their lines.

3) take reasonable steps to work with facility owners including, without limitation, scheduling and conducting a preconstruction meeting, so that the Contractor may locate the facilities at a time reasonably in advance of the actual start of excavation or demolition work for each phase of the Work if the Project is a complex project as defined in 73 P.S. § 176 or if an excavation Contractor intends to perform work at multiple sites or over a large area. After commencement of excavation or demolition work, the excavation Contractor shall be responsible for protecting and preserving the staking, marking or other designation until no longer required for proper and safe excavation or demolition work at or near the underground facility, or by contacting the One Call System to request that the facilities be marked again in the event that the previous markings have been compromised or eliminated.

4) comply with the requirements established by the One Call System as determined by the board of directors regarding the maximum area that a notification may cover.

5) inform each operator employed by the excavation Contractor at the Project site of the information received with respect to location and type of underground installations and any other information required by 73 P.S. § 176, et. seq.

6) report immediately to the Owner, Construction Manager, and the Architect, any break or leak on its lines or any dent, gouge, groove, or other damage to such lines, to their coating or cathodic protection, made or discovered in the course of the excavation or demolition work.

7) immediately notify 911 and the facility owner if the damage results in the escape of any flammable, toxic or corrosive gas or liquid which endangers life, health or property.

8) assist a facility owner in determining involvement of a facility owner's lines by disclosing additional available information requested by the facility owner, including, without limitation, dimensions, and the direction of proposed excavations.

9) re-notify the One Call System unless other arrangements have been made directly with the facility owners involved at the Project site if the excavation Contractor removes its equipment and vacates the Project site for more than 2 business days.

10) submit an incident report to the Department of Labor and Industry of the Commonwealth of Pennsylvania not more than 10 business days after striking or otherwise damaging a facility owner's line during excavation or demolition activities that resulted in personal injury or property damage to parties other than the affected excavation Contractor or facility owner.

11) comply with all requests for information by the Department of Labor and Industry of the Commonwealth of Pennsylvania relating to such Department of Labor and Industry's enforcement authority under the 73 P.S. § 176, et. seq. within 30 days of the receipt of the request.

12) ensure the accuracy of the information provided to the One Call System pursuant to 73 P.S. § 176, et. seq.

13) become thoroughly acquainted with and comply with all other terms and conditions specified in 73 P.S. § 176, et. seq., as amended from time to time including, without limitation, the Contractor shall pay all applicable fees.

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14) complete the site excavation in full compliance with all applicable standards, codes, laws, ordinances, regulations and/or requirements of any applicable State, Federal or governmental agency.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Construction Manager, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.3.3 In the event the Contractor should breach any obligation imposed by the Contract Documents, in addition to all other damages, losses, costs and relief, whether in law or equity, which the Owner may recover, the Owner shall also be entitled to an award for any reasonable legal fees, expert witness fees, and consultant fees incurred in attempting to enforce or recover under the Contract Documents by reason of the Contractor's breach. The Owner's right to recover under the Contract Documents, at law or in equity, shall not be restricted to the rights and remedies set forth in Article 15 of these General Conditions.

§ 13.3.4 In the event that the Owner declares the Contractor in default and the Contractor's Surety fails to adhere to its obligations under the Performance Bond or Payment Bond, the Surety shall be liable to the Owner for any and all damages that the Owner incurs including, but not limited to, any attorney's fees, professional fees, or other costs or expenses incurred by the Owner in connection with the Owner's pursuit of its rights under the Performance Bond, Payment Bond and/or applicable law, including the cost of all litigation, including but not limited to, attorney's fees, professional fees, and costs.

§ 13.3.5 To the extent any Contractor sues the Owner, and the Owner prevails in such litigation, the Contractor shall be responsible for all of the Owner's damages, costs and expenses including but not limited to, any and all professional fees or expert witness fees (e.g., Architectural fees, Construction Management fees, and legal fees).

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. The Contractor shall make arrangements for and conduct or obtain such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals including, without limitation, the cost of retesting for verification of compliance if necessary, until the Architect or the Construction Manager certify(ies) that the Work in question does comply with the requirements of the Contract Documents, and all such costs shall be included in the Contract Sum. The Contractor shall give the Construction Manager and Architect timely notice of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until the Agreement is executed. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require. At the Owner's option, the Owner may retain a field-testing agency or other testing agencies for this Project, as the Owner deems necessary, in its sole discretion.

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§ 13.4.2 If the Construction Manager, Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Construction Manager and Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Construction Manager and Architect of when and where tests and inspections are to be made so that the Construction Manager and Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense. At the Owner's option, the Owner may retain a separate entity to perform the additional testing, inspection, or approval not included under Section 13.4.1.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Construction Manager's and Architect's services and expenses, shall be at the Contractor's expense. Such amounts will be deducted, to the extent available, from any amount due the Contractor. If the amount due the Contractor is not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner within 7 calendar days of receipt of the Owner's invoice for such legal fees, professional fees or other cost or expenses.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Construction Manager for transmittal to the Architect.

§ 13.4.5 If the Construction Manager or Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Construction Manager or Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate of 3% simple interest per annum, as set for the in Article 5.3 of the AIA, A132-2019, Standard Form of Agreement between Owner and Contractor.

§ 13.6 Interpretations

§13.6.1 The captions and headings of various Articles and Section in the Contract Documents are for convenience only and are not to be construed as defining or limiting, in any way, the scope or intent of the provisions hereof.

§ 13.6.2 The invalidity of any covenant, restriction, condition, limitation or any other part or provision of the Contract Documents shall not impair or affect in any manner the validity, enforceability, or effect of the remainder of the Contract Documents.

§ 13.6.3 References to Sections or paragraphs shall also be deemed to include the respective Subparagraphs.

§ 13.6.4 The parties hereto expressly waive the defense of contra proferentem, i.e., that the Contract Documents or any portion of the Contract Documents may be construed against any party as the drafter thereof.

§ 13.7 Employment Policies

§ 13.7.1 The Contractor shall maintain policies of employment as follows:

§ 13.7.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment, or recruitment advertising; lay-off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

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§ 13.7.1.2 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

Intentionally deleted..

(Paragraphs deleted)

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- **.1** refuses or fails to supply enough properly skilled workers or proper materials;
- **.2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- **.3** disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;
- **.4** otherwise materially breaches of a provision of the Contract Documents; or
- **.5** submits an Application for Payment, sworn statement, Waiver of Lien, Affidavit or document of any nature whatsoever which it intentionally falsified; or
- **.6** institutes proceedings or consent to proceedings requesting relief or arrangement under the Federal Bankruptcy Code or any similar or applicable federal or state law; or if a Petition under any federal or state Bankruptcy or Insolvency Law against the Contractor and such Petition is not dismissed within 60 days of the day of said filing; or if the Contractor admits, in writing, its inability to pay its debts generally if they become due, or if Contractor makes a general assignment for the benefit of the creditors, or if a Receiver, Liquidator, Trustee or Assignee is appointed on account of Contractor's bankruptcy or insolvency; or if the Receiver of all or any substantial portion of the Contractor's property is appointed.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, after consultation with the Construction Manager, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven calendar days' notice, the Contract and may, subject to any prior rights of the surety:

- **.1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- **.2** Accept assignment of subcontracts pursuant to Section 5.4; and
- **.3** Finish the Work by whatever reasonable method the Owner may deem expedient.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds all costs to the Owner of completing the Work, including compensation for the Construction Manager's and Architect's services and expenses made necessary thereby, such excess shall be paid to the Contractor less Owner's costs for completing the Work as of the date of termination. If such costs and damages to the Owner of completing the Work exceed the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner immediately upon Owner's demand. The cost to the Owner of completing the Work shall include (but not be limited to) the cost of any additional architectural, construction management, managerial and administrative services required thereby, any costs incurred in retaining another Contractor or other Subcontractor to complete the Work, any additional interest or fees which the Owner may incur by reason of the delay in completion of the Work, attorney's fees and expenses incurred by the Owner, and any other damage, costs and expenses which Owner may incur by reason of completing the Work or any delay thereof. The amount, if any, to be paid to the Contractor , shall be certified by the Initial Decision Maker after consultation with the Architect upon application, in the manner provided in Article 9.4.

§ 14.2.5 Notwithstanding any other provision of the Contract Documents to the contrary, in the event that the Contractor abandons its Work on the Project, as determined by the Owner in its sole discretion, and the Contractor does not resume its Work after 72 hours prior written notice from the Owner, the Owner may terminate the Contractor for cause without such termination being subject to the Initial Decision Maker's certification required by Section

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14.2.2. The Owner's rights set forth in this Section 14.2.5 shall be in addition to all other rights of the Owner granted in the Contract Documents, at law, or in equity.

§ 14.2.6 In the event the Owner elects to terminate the Contractor for cause, the Owner may recover against the Contractor and Surety as part of its damages any and all legal fees, professional fees, jointly and severally, including, but not limited to, Architectural fees, Construction Management fees, expert witness and consultant fees, legal fees, and all other costs and expenses related thereto. The Owner shall have the right to set off said amounts against any amount alleged to be due and owing to the Contractor on the base amount of the Contract. Further, should the Contractor fail to achieve Final Completion promptly, upon written recommendation by the Architect and upon notice to the Contractor and after reasonable opportunity to cure, the Owner may, for cause, terminate the Contractor, complete the Work, and recover against the Contractor or Surety, any and all amounts that the Owner incurs, including, but not limited to, any and all legal fees, professional fees and all other costs and expenses related thereto. This provision shall create no right to the Contractor or to any other person or entity for payment of such costs or expenses.

§ 14.2.7 In the event that the Owner declares the Contractor in default and the Contractor's Surety fails to adhere to its obligations under the Performance Bond and Payment Bond, the Surety shall be liable to the Owner for any and all damages that the Owner incurs including, but not limited to, any legal fees, professional fees, or other costs or expenses incurred by the Owner in connection with the Owner's pursuit of its rights under the Performance Bond and Payment Bond and/or applicable law, including, but not limited to, the cost of all litigation, legal fees, professional fees, and all other costs and expenses.

§ 14.2.8 In the event that the Owner terminates the Contract for cause pursuant to Section 14.2 and a court of competent jurisdiction determines that cause for termination did not exist, then the termination shall be treated as a termination for convenience pursuant to Section 14.4 and the Contractor shall be compensated in accordance with Section 14.4.3.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 In such event, if applicable, the Contractors shall be entitled to an equitable extension of Contract Time pursuant to Section 8.3.1 caused by the suspension, delay, or interruption under Section 14.3.1.
(Paragraphs deleted)
The Contractor shall not be entitled to any adjustment in the Contract Sum.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- **.1** cease operations as directed by the Owner in the notice;
- **.2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- **.3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work completed by the Contractor in accordance with the Contract Documents. The Contractor shall not be entitled to receive more than $10,000 for compensation, including, without limitation, for field and office overhead or profit (e.g., expected or actual profit) for Work not executed, termination expenses, or damages. In case of such termination of the Contract for the Owner's convenience, Contractor shall be entitled to receive payment from the Owner only for Work which has been certified by the Architect as having been completed by the Contractor.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also

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includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Contractor shall commence all Claims and causes of action against the Owner related to the Contract Documents, whether in contract, tort, or otherwise, within six (6) months of Project completion unless a shorter time applies pursuant to the terms of this Agreement. The Contractor acknowledges that the Owner is a Pennsylvania Public School District and the doctrine of *nullum tempus occurrit regi* applies to its maintenance and repair of school buildings.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Except as provided herein, claims by the Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by written notice to the Owner and to the Initial Decision Maker with a copy sent to the Architect. Claims by the Contractor under this Section 15.1.3.1 shall be initiated within 21 calendar days after occurrence of the event giving rise to such Claim or within 21 calendar days after the Contractor first recognizes the condition giving rise to the Claim, whichever is later. The Contractor shall provide written notice of the claim to the Owner in accordance with the requirements set forth herein. The words "written notice" shall be defined as a letter of claim with a title or a caption stating, "Notice of Claim" and shall provide a description of the claim, shall reference related correspondence and/or directives and/or other relevant documents, and the cost and/or time impact of the claim to the Contractor. Provided however, that Claims by the Owner or the Contractor arising from or relating to the Owner's termination of the Contractor's services under Article 14 of this Agreement shall neither be submitted to, nor shall be subject to initial review and decision by, the Initial Decision Maker. If not resolved by the parties, such Claims be subject to dispute resolution under the further provisions of this Article 15.

§ 15.1.3.2 Intentionally deleted.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments for undisputed amounts in accordance with the Contract Documents.

§ 15.1.4.2 The Construction Manager or Architect will prepare Change Orders and the Construction Manager will issue a Certificate for Payment or Project Certificate for Payment in accordance with decisions of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the Work No claims for additional costs will be considered for delays caused by the Contractor or other Contractors, coordination issues, project schedules, phasing sequence, or other unforeseen circumstances. Claims for such delays shall be limited to claims for increase in the Contract Time.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in herein shall be given before proceeding to execute the Work. The Contractor's Claim shall include an estimate of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary. The Contractor's sole recourse for delays is included in Section 8.3 of these General Conditions.

(Paragraph deleted)

§ 15.1.6.2. If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction. Extensions for weather delays shall be granted only upon satisfaction of all of the following:

1. The delay must be demonstrated to have had a direct impact on the critical path of the updated CPM schedule for the delay period. The Contractor shall maintain adequate records and submit them, together with a revised CPM schedule showing the impact, with each weather delay claim. Weather

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delay claims shall be submitted monthly, within five (5) business days after the end of the month in which the delay occurred.

2. The Owner will determine entitlement. Daily records maintained by the Construction Manager shall be the official source for weather data related to precipitation, snowfall, and temperature. The statistical baseline for determining "above normal" or "below normal" conditions shall be the NOAA 30-Year Climate Normals for the weather station nearest the Project site, as published by the National Oceanic and Atmospheric Administration (NOAA). No more than one (1) day of time extension will be granted for each day of lost work, regardless of the number of concurrent causes. Any extension granted is non-compensable and has no impact on Contract Price.
3. Temperatures above or below the NOAA 30-Year Climate Normal mean for the project location and time of year are not, by themselves, justification for a time extension unless a direct critical-path impact is demonstrated.
4. Snow Extensions: Only snow days with more than three inches (3") of accumulated snow cover that directly impact the CPM schedule will be considered. The Contractor shall document snow depth measurements at the Project site.
5. Precipitation Extensions: Only workdays with precipitation greater than one-tenth inch (0.10"), as recorded by the Construction Manager or verified against NOAA data, that directly impact the CPM schedule will be considered.

§ 15.1.6.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work, and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

§ 15.1.6.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

§ 15.1.7 Claims for Consequential Damages and/or Incidental Damages

The Contractor waives all Claims against the Owner for consequential and/or incidental damages arising out of or relating to this Contract. This waiver includes, but is not limited to:

.1 consequential damages incurred by the Contractor for office expenses, including without limitation, personnel stationed there, for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and for loss of actual and expected profit.

.2 incidental damages incurred by the Contractor for principal office expenses including, without limitation, costs resulting from stopping the Work, removing and transporting the Contractor's property (e.g., the Contractor's equipment, supplies and materials), and storing the Contractor's property (e.g., the Contractor's equipment, supplies and materials) at an alternate location.

This waiver is applicable, without limitation, to all consequential damages and/or incidental damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents or the Owner's recovery of consequential or incidental damages permitted under applicable laws.

§ 15.1.8 Construction Acceleration Claims

No claim for an increase in the Contract Sum or change in the Contract Time shall be based on construction acceleration. Accordingly, no course of conduct or dealings between the parties, or any express or implied statements made by the parties, nor any express or implied acceptance of alterations to the Work, and no claim that the Owner has been unjustly enriched by any alteration or addition to the Work, whether or not there is in fact any such unjust enrichment, shall be the basis for any claim to an increase in the Contract Sum or change in the Contract Time.

§ 15.1.9 Claims for Economic Loss

The Contractor shall have no claim or right of recovery of damages against the Owner, the Architect and/or the Construction Manager for economic loss sustained, in whole or in part, by any act or omission of the Owner, the

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Architect and/or the Construction Manager to the extent that such act or omission constitutes a breach of contract. Specifically, and without limiting the generality of the foregoing, the Contractor shall have no claim against the Owner, the Architect and/or the Construction Manager for economic loss based upon any tort, including, without limitation, negligence, negligent misrepresentation, or any other tort-based theory of liability.

§ 15.2 Initial Decision

§ 15.2.1 Claims between the Owner and Contractor, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker. An initial decision shall be required as a condition precedent to dispute resolution proceedings related to that of any Claim arising prior to the date final payment is due, unless 30 calendar days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten business days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons and the Contractor and the Owner shall equally share the expense relating to the retention of such persons.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten business days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties, the Construction Manager, and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject the dispute resolution process set forth in the Contract Documents.

§ 15.2.6 When a written decision of the Architect states that (1) the decision is final but subject to litigation and (2) filing of a lawsuit or a claim covered by such decision must be made by the Contractor within 30 calendar days after the date on which the Contractor receives the final written decision, then the Contractor's failure to file suit within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Contractor. If the Architect renders a decision after litigation proceedings have been initiated, such decision may be entered as evidence, but shall not supersede litigation proceedings unless the decision is acceptable to all parties concerned.

§ 15.2.6.1 Intentionally deleted.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 Intentionally deleted.

§ 15.2.9 To the extent any Contractor asserts frivolous claims or asserts claims in bad faith, and the Owner incurs any legal fees, professional fees, expert witness fees, expenses, costs (including, but not limited to, employee cost), the Contractor shall be liable for such fees, expenses or costs, and the Contractor shall reimburse the Owner for such legal

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fees, professional fees, costs and expenses immediately upon demand by the Owner. This provision shall create no right to the Contractor of any other person or entity for payment of such costs or expenses.

§ 15.3 Mediation

§ 15.3.1 Any claims, disputes, or other matters in question arising out of or related to the Contract, shall be subject to non-binding mediation, but only upon mutual agreement of the Owner and Contractor.

§ 15.3.2 The Owner and Contractor mutually agree to proceed to non-binding mediation, they shall agree upon a forum for the mediation.

§ 15.3.3 Intentionally deleted.

§ 15.3.4 Intentionally deleted.

§ 15.4 Dispute Resolution

§ 15.4.1 If the Owner and Contractor do not mutually agree to proceed to non-binding mediation, or if the parties do not resolve their dispute in non-binding mediation, then the parties, including the Contractor's surety, agree to have any claims, disputes or other matters in question arising out of or relating to this Agreement, decided by the Court of Common Pleas of Montgomery County. The parties, including the Contractor's surety, hereby submit to the exclusive jurisdiction of said Court and further agree that the venue of said Court shall be proper in all respects. To the extent the Contractor pursues a claim or litigation against the Owner and the Owner prevails, partially or completely, on any or all of its own claims or defenses to the Contractor's claims, leaving the Contractor with less than fifty percent (50%) recovery, the Contractor will be liable for any and all legal fees, professional fees, expert witness fees, costs or expenses of the Owner, as well as the true cost of any of the Owner's employees' time, associated with analyzing any claim, pursuing litigation or defending the claim or litigation and the Contractor shall reimburse the Owner for such legal fees, expert witness fees, professional fees, costs and expenses immediately upon demand by the Owner. This provision shall create no right to the Contractor of any other person or entity for payment of such costs or expenses.

(Paragraph deleted)

§ 15.4.2 If the Owner incurs any legal fees, professional fees, or other costs or expenses, pursuing claims or litigation against the Contractor and the Owner prevails on more than 50% of the claims or amounts claimed, then the Contractor shall be responsible to the Owner for the Owner's legal fees, professional fees, expert witness fees, or other costs or expenses incurred as a result of the dispute. Those amounts will be deducted, to the extent available, from any amount due the Contractor. If the amount due the Contractor is not sufficient to cover such cost, the Contractor, and its Surety, shall pay the difference to the Owner within 7 calendar days of receipt of the Owner's invoice for such legal fees, expert witness fees, professional fees, or other cost or expenses.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

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SECTION 00 73 19 - SAFETY

PART 1 - GENERAL

1.01 OVERVIEW

A. The personal safety and health of all workers at the project site is of primary importance. The prevention of occupationally induced injuries/illnesses and the compliance with regulatory requirements will be given precedence over operating productivity whenever necessary.

1.02 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.
B. 00 21 14 Pennsylvania School Districts OCIP Insurance Manual
C. 00 72 00 General Conditions of the Contract.
D. 01 33 00 Submittal Procedures

1.03 SUBMITTALS

A. Submission of the following is required prior to commencement of work and per 01 33 00 Submittal Procedures.

1. Site Specific Safety Plan including process for weekly toolbox talks
2. Silica Plan (if your scope of work creates silica concerns, this must be included)
    a. Proper training documentation to be included.
3. Fall Protection Plan (if your work will require any activity above 6', lifts, roof work, etc.)
    a. A Competent Person must be identified along with proper training documentation.
4. Steel/Pre-cast Erection Plan (must be specific to this project)
5. Crane and pick plan if applicable (certification of crane operator & rigger)
6. Trench / Excavation Safety (if your scope will be trenching or have open excavations this is required)
    a. A Competent Person must be identified along with proper training documentation.
7. Confined Space Plan (if your scope requires work in a confined space, this is required)
    a. Proper training documentation to be included.

8. Hot Work Plan (if your scope requires hot work, this is required)
    a. Must also include training documentation and example of hot work permit.
9. COVID 19 Preparedness Plan
10. SDS Sheets
    a. Must be readily available (identify the process i.e., paper copies, smartphone, etc.)

1.04 OUTLINE OF RESPONSIBILITIES

A. Each Contractor is responsible for compliance with all applicable governmental safety regulations for their operations, and the coordination of safety precautions with other Contractors on-site.
B. Each Contractor shall appoint an on-site safety representative who is responsible for administering the Contractor's safety program and has the authority to act on behalf of the Contractor on safety issues.
C. The Contractor's on-site safety representative shall train and instruct their employees, attend project safety meetings, immediately supervise the correction of unsafe acts or conditions, investigate all accidents and injuries involving Contractor employees and conduct weekly safety meetings with their employees.
D. Each Contractor shall submit a written report of all accidents causing personal injury or property damage to Construction Manager’s Project Manager within 24 hours of their occurrence. The report must include the date and time of the occurrence, damage to equipment or work, names of injured employees, nature of injury, description of the accident/incident and what will be done to prevent the accident/incident from happening again.
E. A Construction Manager representative or their 3rd party consultant will periodically evaluate contractor safety activities and performance in conjunction with each Contractor safety representative. Non- conforming activities or performance shall be corrected by the Contractor immediately.”
F. The use of alcohol or drugs by workers on-site is strictly prohibited.
G. Each Contractor shall maintain the construction site and building premises in a clean and orderly manner, in conformity with all governmental regulations, OSHA standards and recommendations.
H. Reference Article 10 of the General Conditions of the contract for other Contractor safety responsibilities.

1.05 SAFE WORK PRACTICES

A. Any condition or practice that a worker observes that might cause personal injury or damage to equipment should be reported to his supervisor immediately.
B. Workers shall not operate any equipment that, in their opinion, is not in safe working condition.
C. Trade Contractors shall ensure that their employees who operate any equipment have been trained & authorized by Trade Contractor and supply this information to the CM upon request.

D. All prescribed safety and personal protective equipment must be used when warranted and said equipment shall be maintained in good working condition. Boots, hard hats and class 2 safety vests must be worn at all times. Eye protection and ear protection shall be available and ready to use when there is a hazard exposure i.e. cutting, grinding, etc.
E. Radios will be allowed at a reasonable level; however, earbuds will not be allowed.
F. Trade Contractors shall train their employees in proper lifting techniques.
G. Trade Contractors engaged in, but not limited to, excavation, scaffolding, fall protection, etc. shall identify their respective competent person (OSHA 1926.32(f) to Construction Manager prior to the commencement of their work.
H. Horseplay will not be permitted on the project.
I. Any Trade Contractor whose employees use powder actuated tools must train their employees in their safe operation, and each employee using such tools shall carry certification that they have been properly trained.
J. Trade Contractors shall not move or disable access/egress lighting. Each Trade Contractor shall provide his own task lighting.
K. Each Trade Contractor shall be responsible to install guardrails, toe boards, etc.
L. Shirts shall be worn at all times. Shirts with sleeves less than 4" or that do not fully cover the torso are not permitted. Tennis shoes (or soft soled shoes) shall not be worn on-site.
M. The use of all tobacco products on public property is prohibited and will be strictly enforced.
N. The use of alcohol or drugs by workers on site is absolutely prohibited. Any worker who violates this policy or is found to be impaired by alcohol or drugs shall be immediately removed from the site by his employer. The Owner or Construction Manager shall have the authority to direct a Trade Contractor to remove a worker from the site.

    1. Drug or alcohol "use" means consuming, possessing, distributing, concealing, buying, or selling, being under the influence, or reporting for duty while under the influence of alcohol or drugs to any degree.
    2. The term "alcohol or drugs" means any form of alcohol or other intoxicating beverage and every type of drug, narcotic plant, or similar narcotic substance, whether illegal or not. Workers who are taking prescription drugs in accordance with a valid prescription must advise their supervisor. The supervisor must determine whether any work restrictions are appropriate. The supervisor shall notify the Project Superintendent of any such work restrictions.

O. Each Trade Contractor shall ensure that their employees are trained and knowledgeable of the specifics of this Safety Policy and must attend safety orientation prior to them working.
P. Trade Contractors violating the Safety Policy will be issued via Procore a "Safety and Health Violation Observation" as warranted by the Project Superintendent. All violations must be corrected immediately and responded to in Procore.
Q. No tools or equipment will be allowed on-site if factory installed or supplied guards and safety devices have been removed, altered, or not used.
R. Warning signage applicable to operations being performed shall be posted prior to commencing work i.e., lasers in use, controlled access to roof, etc.
S. All contractors shall provide current OSHA approved asbestos awareness training to all of its employees prior to jobsite mobilization. Contractors shall include certification of this training in their jobsite specific Safety Manual.

T. Contractors are strongly encouraged to conduct daily pre-task plans to help identify potential safety risks and methods to mitigate them.

1.06 ENFORCEMENT

A. Contractors or employees failing to comply with safety requirements shall be subject to disciplinary action. Disciplinary action could include, but is not limited to the following:

1. Removal of a Contractor, Sub-Contractor, or employee from the site.
2. Reduction or withholding of progress payments until safety violations are corrected.
3. Payment of costs for correction of a safety hazard created by the Contractor when an imminent safety hazard exists, or when previous notices are not adequately responded to.
4. Termination of the contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 00 73 19

SECTION 00 73 43 - PREVAILING WAGE RATE REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Prevailing Wage Act.
2. Pennsylvania Department of Labor and Industry “Weekly Payroll Certification for Public Works Projects” Form LLC-25 follows as Section 00 73 44.
3. Pennsylvania Prevailing Wage Determination Schedule follows as Section 00 73 46.

1.03 PREVAILING WAGE RATES

A. The general provisions of the Pennsylvania Prevailing Wage Act, approved August 15, 1961, as amended are applicable to this project.
B. The general prevailing minimum wage rates including contributions for employee benefits as shall have been determined by the Secretary of Labor and Industry (hereinafter “Secretary”), which must be paid to the workmen, employed in the performance of the Contract.
C. The Contractor shall pay no less than the wage rates as determined in the decision of the Secretary and shall comply with the conditions of the Pennsylvania Prevailing Wage Act approved August 15, 1961 (Act No. 442), as amended August 9, 1963 (Act No. 342), and the Regulations issued pursuant thereto, to assure the full and proper payment of said rates. Contact PA Department of Labor and Industry for clarification of any classification of workers.
D. These Contract provisions shall apply to all work performed on the Contract by the Contractor and to all work performed on the Contract by all subcontractors.
E. The Contractor shall insert in each of his subcontracts all of the stipulations contained in these required provisions.
F. No workmen may be employed on the Work except in accordance with the classifications set forth in the decision of the Secretary. In the event that additional or different classifications are necessary, the procedure set forth in the Regulations shall be followed.
G. All workmen employed or working on the Work shall be paid unconditionally, regardless of whether any contractual relationship exists or the contractual relationship which may be alleged to exist between any contractor, subcontractor, and workmen, not less than

once a week without deductions or rebate, on any account, either directly or indirectly, except authorized deductions, the full amount due at the time of payment, computed at the rates applicable to the time worked in the appropriate classification. Nothing in this Contract, the Act or the Regulations shall prohibit the payment of more than the general prevailing minimum wage rates as determined by the Secretary to the workmen on the Work.

H. The Contractor and each subcontractor shall post for the entire period of construction the wage determination decisions of the Secretary, including the effective date of any changes thereof, in a prominent and easily accessible place or places at the site of the work and at such place or places used by them to pay workmen their wages. The posted notice of wage rates must contain the following information:

1. Name of project.
2. Name of public body of which it is constructed.
3. The crafts and classifications of workmen listed in the Secretary's general prevailing minimum wage rate determination for the particular project.
4. The general prevailing minimum wage rates determined for each craft and classification and the effective date of any changes.
5. A statement advising workmen that if they have been paid less than the general prevailing minimum wage rate for their job classification or that the Contractor and/or subcontractor are not complying with the Act or the Regulations in any manner whatsoever, they may file a protest with the Secretary within three (3) months of the date of the occurrence, objecting to the payment to the Contractor to the extent of the amount or amounts due or to become due to them as wages for work performed on the Project. Any workmen paid less than the rate specified in the Contract shall have a civil right of action for the difference between the wage paid and wages stipulated in the Contract, which right of action must be exercised within six (6) months from the occurrence of the event creating such right.

I. The Contractor and all subcontractors shall keep an accurate record showing the name, craft and/or classification, number of hours worked per day, and the actual hourly rate of wage paid (including employee benefits) to each workman employed by him in connection with the Work and such record must include any deductions from each workman. The record shall be preserved for two (2) years from the date of payment and shall open at all reasonable hours to the inspection of the Owner and to the Secretary or his duly authorized representative.

1. Apprentices shall be limited to such numbers as shall be in accordance with a bona fide apprenticeship program registered with and approved by the Pennsylvania Apprenticeship and Training Council and only apprentices whose training and employment are in full compliance with the provisions of the Apprenticeship and Training Act approved July 14, 1961 (Act No. 304) and the Rules and Regulation issued pursuant thereto shall be employed on the Work. Any workmen using the tools of a craft that does not qualify as an apprentice within the provisions of this submission shall be paid the rate predetermined for journeyman in that particular craft and/or classification.

J. Wages shall be paid without any deductions except authorized deductions. Employers not party to a contract requiring contributions for employee benefits which the Secretary has determined to be included in the general prevailing minimum wage rate shall pay the monetary equivalent thereof directly to the workman.

K. Payment of compensation to workmen for work performed on public work on a lump sum basis, or apiece work system, or a price certain for the completion of a certain amount of work, or the production of a certain result shall be deemed a violation of the Act and the Regulations, regardless of the average hourly earnings resulting therefrom.

L. Each Contractor and each subcontractor shall file a statement each week and a final statement at the conclusion of the Work on the Contract with Owner, under oath, and in form satisfactory to the Secretary, certifying that all workmen have been paid wages in strict conformity with the provisions of the Contract as prescribed by the Regulations, or if any wages remain unpaid, to the amount of wages due and owing to each workman respectively.

M. The provision of the Act and the Regulations are incorporated by reference in the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

A. Prevailing wage certification forms are to be produced weekly and are to be submitted monthly. Prevailing wage certificates are to be sent to Architect and CM with a pencil copy of the Application for Payment. No Applications for Payment will be processed without the proper prevailing wage certificates. Contractor may be requested to submit the prevailing wage certification forms in any of the following manners:

1. If hard paper copies are submitted, Contractor shall submit two (2) copies of each prevailing wage certification form.
2. If digital copies are submitted, Contractor shall submit to Architect and CM in PDF form.
3. Redacted certified payroll:

    a. Prevailing wage certification forms submitted to the Owner may not be redacted by law; however, if there is a Project Right-to-Know request, the Contractor will be required to submit redacted prevailing wage certification forms **in addition** to the required unredacted forms. The following information may be redacted:

        1) Employee Name
        2) Employee Address
        3) Employee Social Security Number

B. Contractor shall use the Commonwealth of Pennsylvania Department of Labor and Industry Form LLC-25 (form can be accessed at: http://www.dli.pa.gov/Individuals/Labor-Management-Relations/Documents/llc-25.pdf), as revised from time to time, and ensure proper classification of workmen are assigned to each person. Certificates must be filled out in their entirety. Form is included as Specification Section 00 73 44. Certified Payroll submitted on U.S. Wage and Hour Division forms are NOT accepted and will be returned to the Contractor.

C. Regardless of the submission type, the first and the final certification forms must be notarized, signed, and dated.

END OF SECTION 00 73 43

WEEKLY PAYROLL CERTIFICATION FOR PUBLIC WORKS PROJECTS

☐ Contractor or ☐ Subcontractor (Please check one) **ALL INFORMATION MUST BE COMPLETED**

CONTRACTOR ADDRESS	SUBCONTRACTOR ADDRESS	DEPARTMENT OF LABOR & INDUSTRY COMMONWEALTH OF PENNSYLVANIA BUREAU OF LABOR LAW COMPLIANCE PREVAILING WAGE DIVISION 7TH & FORSTER STREETS HARRISBURG, PA 17120 1-800-932-0665

PAYROLL NUMBER	WEEK ENDING DATE	PROJECT AND LOCATION PROJECT SERIAL # PROJECT #

EMPLOYEE NAME	APPR. RATE (%)	WORK CLASSIFICATION	DAY AND DATE Su M Tu W Th F Sa HOURS WORKED EACH DAY	S-TIME 0-TIME	BASE HOURLY RATE	TOTAL FRINGE BENEFITS (C=Cash) (FB=Contributions)*	TOTAL DEDUCTIONS	GROSS PAY FOR PREVAILING RATE JOB(S)	CHECK #
						C: FB:			
						C: FB:			
						C: FB:			
						C: FB:			
						C: FB:			

*SEE REVERSE SIDE

PAGE NUMBER _____ OF _____

THE NOTARIZATION MUST BE COMPLETED ON FIRST AND LAST SUBMISSIONS ONLY. ALL OTHER INFORMATION MUST BE COMPLETED WEEKLY.

*FRINGE BENEFITS EXPLANATION (FB): Bona fide benefits contribution, except those required by Federal or State Law (unemployment tax, workers' compensation, income taxes, etc.)

Please specify the type of benefits provided and contributions per hour:

1) Medical or hospital care _____
2) Pension or retirement _____
3) Life insurance _____
4) Disability _____
5) Vacation, holiday _____
6) Other (please specify) _____

CERTIFIED STATEMENT OF COMPLIANCE

1. The undersigned, having executed a contract with _____
(AWARDING AGENCY, CONTRACTOR OR SUBCONTRACTOR)

_____ for the construction of the above-identified project, acknowledges that:

(a) The prevailing wage requirements and the predetermined rates are included in the aforesaid contract.

(b) Correction of any infractions of the aforesaid conditions is the contractor's or subcontractor's responsibility.

(c) It is the contractor's responsibility to include the Prevailing Wage requirements and the predetermined rates in any subcontract or lower tier subcontract for this project.

2. The undersigned certifies that:
   (a) Neither he nor his firm, nor any firm, corporation or partnership in which he or his firm has an interest is debarred by the Secretary of Labor and Industry pursuant to Section 11(e) of the PA Prevailing Wage Act, Act of August 15, 1961, P.L. 987 as amended, 43 P.S.§ 165-11(e).

   (b) No part of this contract has been or will be subcontracted to any subcontractor if such subcontractor or any firm, corporation or partnership in which such subcontractor has an interest is debarred pursuant to the aforementioned statute.

3. The undersigned certifies that:
   (a) the legal name and the business address of the contractor or subcontractor are: _____
   _____

   (b) The undersigned is: ☐ a single proprietorship ☐ a corporation organized in the state of _____
   ☐ a partnership ☐ other organization (describe) _____

   (c) The name, title and address of the owner, partners or officers of the contractor/subcontractor are:

NAME	TITLE	ADDRESS

The willful falsification of any of the above statements may subject the contractor to civil or criminal prosecution, provided in the PA Prevailing Wage Act of August 15, 1961, P.L. 987, as amended, August 9, 1963, 43 P.S. § 165.1 through 165.17.

_____ (DATE)

_____ (SIGNATURE)

_____ (TITLE)

_____ SEAL

Taken, sworn and subscribed before me this _____ Day of _____ A.D., _____

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project Name:	Pottsgrove High School - Facilities & Athletic Improvements
General Description:	Installation of new home side bleachers, a new running track, a new synthetic turf field, associated support buildings, new parking lots, and related site improvements.
Project Locality	Lower Pottsgrove Township
Awarding Agency:	Pottsgrove School District
Contract Award Date:	12/8/2026
Serial Number:	26-08475
Project Classification:	Highway
Determination Date:	9/21/2026
Assigned Field Office:	Philadelphia
Field Office Phone Number:	(215)560-1858
Toll Free Phone Number:	
Project County:	Montgomery County

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-08475 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	5/1/2025		$60.84	$48.71	$109.55
Asbestos & Insulation Workers	5/1/2026		$64.51	$50.26	$114.77
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2024		$36.71	$19.13	$55.84
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2026		$41.34	$19.23	$60.57
Boilermakers	1/1/2024		$52.10	$35.72	$87.82
Boilermakers	1/1/2026		$58.00	$36.57	$94.57
Bricklayer	5/1/2025		$50.00	$32.57	$82.57
Bricklayer	5/1/2026		$51.15	$34.92	$86.07
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		$54.59	$29.02	$83.61
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		$47.47	$29.02	$76.49
Carpenter - Rodman (Surveying & Layout)	5/1/2025		$23.74	$20.62	$44.36
Carpenters	5/1/2026		$48.55	$30.39	$78.94
Carpenters	5/1/2027		$50.46	$30.74	$81.20
Carpenters	5/1/2028		$52.43	$31.09	$83.52
Carpenters	5/1/2029		$54.46	$31.44	$85.90
Carpenters	5/1/2030		$56.55	$31.79	$88.34
Cement Finishers & Plasterers	5/1/2022		$38.57	$32.39	$70.96
Cement Masons	5/1/2024		$46.70	$32.46	$79.16
Cement Masons	5/1/2025		$48.70	$32.46	$81.16
Dockbuilder, Pile Drivers	5/1/2026		$56.98	$37.99	$94.97
Dockbuilder/Pile Driver Diver	5/1/2026		$66.54	$41.74	$108.28
Dockbuilder/pile driver tender	5/1/2026		$56.98	$37.99	$94.97
Drywall Finisher	5/1/2025		$40.14	$32.35	$72.49
Drywall Finisher	5/1/2026		$41.10	$32.99	$74.09
Electricians	5/1/2026		$62.41	$48.50	$110.91
Electricians	5/1/2027		$66.53	$50.63	$117.16
Electricians	5/1/2028		$70.83	$52.83	$123.66
Elevator Constructor	1/1/2025		$71.85	$45.77	$117.62
Elevator Constructor	1/1/2026		$74.86	$46.86	$121.72
Floor Coverer	5/1/2025		$51.67	$31.69	$83.36
Floor Coverer	5/1/2026		$52.84	$32.86	$85.70
Glazier	5/1/2025		$49.96	$38.34	$88.30
Glazier	5/1/2026		$51.30	$39.37	$90.67
Interior Finish	5/1/2023		$34.60	$25.80	$60.40
Iron Workers (Bridge, Structural, Ornamental, Precast)	7/1/2024		$53.20	$45.01	$98.21
Iron Workers (Riggers)	7/1/2025		$44.77	$36.27	$81.04
Iron Workers (Riggers)	7/1/2026		$48.84	$36.52	$85.36
Iron Workers (Rodman/Reinforcing)	7/1/2025		$47.80	$36.65	$84.45
Iron Workers (Rodman/Reinforcing)	7/1/2026		$52.39	$36.90	$89.29
Laborers (Class 01 - See notes)	5/1/2025		$37.25	$26.10	$63.35
Laborers (Class 02 - See notes)	5/1/2025		$41.00	$27.70	$68.70
Laborers (Class 03 - See notes)	5/1/2025		$37.67	$26.28	$63.95
Laborers (Class 04 - See notes)	5/1/2025		$37.67	$26.28	$63.95

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-08475 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 05 - See notes)	5/1/2025		$37.25	$26.10	$63.35
Landscape Laborer	5/1/2024		$30.70	$24.23	$54.93
Landscape Laborer	5/1/2025		$32.15	$24.30	$56.45
Marble Finisher	5/1/2025		$41.17	$30.75	$71.92
Marble Finisher	5/1/2026		$42.07	$31.85	$73.92
Marble Mason	5/1/2023		$47.20	$31.95	$79.15
Marble Setter	5/1/2026		$51.50	$33.80	$85.30
Mason Tender, Cement	5/1/2023		$35.02	$25.98	$61.00
Millwright	5/1/2025		$57.39	$35.81	$93.20
Millwright	5/1/2026		$60.20	$35.81	$96.01
Operators (Building, Class 01 - See Notes)	5/1/2025		$54.52	$34.49	$89.01
Operators (Building, Class 01 - See Notes)	5/1/2026		$55.67	$35.34	$91.01
Operators (Building, Class 01A - See Notes)	5/1/2025		$57.52	$35.38	$92.90
Operators (Building, Class 01A - See Notes)	5/1/2026		$58.68	$36.22	$94.90
Operators (Building, Class 02 - See Notes)	5/1/2025		$54.27	$34.42	$88.69
Operators (Building, Class 02 - See Notes)	5/1/2026		$55.43	$35.26	$90.69
Operators (Building, Class 02A - See Notes)	5/1/2025		$57.29	$35.29	$92.58
Operators (Building, Class 02A - See Notes)	5/1/2026		$58.44	$36.14	$94.58
Operators (Building, Class 03 - See Notes)	5/1/2025		$50.18	$33.22	$83.40
Operators (Building, Class 03 - See Notes)	5/1/2026		$51.34	$34.06	$85.40
Operators (Building, Class 04 - See Notes)	5/1/2025		$49.88	$33.13	$83.01
Operators (Building, Class 04 - See Notes)	5/1/2026		$51.04	$33.97	$85.01
Operators (Building, Class 05 - See Notes)	5/1/2025		$48.16	$32.62	$80.78
Operators (Building, Class 05 - See Notes)	5/1/2026		$49.32	$33.46	$82.78
Operators (Building, Class 06 - See Notes)	5/1/2025		$47.17	$32.33	$79.50
Operators (Building, Class 06 - See Notes)	5/1/2026		$48.34	$33.16	$81.50
Operators (Building, Class 07A- See Notes)	5/1/2025		$66.26	$39.55	$105.81
Operators (Building, Class 07A- See Notes)	5/1/2026		$67.73	$40.48	$108.21
Operators (Building, Class 07B- See Notes)	5/1/2025		$65.97	$39.46	$105.43
Operators (Building, Class 07B- See Notes)	5/1/2026		$67.44	$40.39	$107.83
Painters Class 1 (see notes)	5/1/2025		$44.38	$34.55	$78.93
Painters Class 1 (see notes)	5/1/2026		$45.71	$35.22	$80.93
Painters - Line Stripping	12/1/2025		$45.12	$29.41	$74.53
Painters Class 4 (see notes)	5/1/2025		$46.47	$34.55	$81.02
Painters Class 4 (see notes)	5/1/2026		$48.45	$35.22	$83.67
Plasterers	5/1/2024		$39.88	$33.08	$72.96
plumber	5/1/2025		$70.53	$39.46	$109.99
plumber	5/1/2026		$73.73	$40.36	$114.09
Pointers, Caulkers, Cleaners	5/1/2025		$51.35	$31.80	$83.15
Pointers, Caulkers, Cleaners	5/1/2026		$53.35	$32.30	$85.65
Roofers (Composition)	5/1/2025		$46.03	$34.77	$80.80
Roofers (Composition)	5/1/2026		$47.53	$35.22	$82.75
Roofers (Shingle)	5/1/2023		$32.85	$22.10	$54.95
Roofers (Shingle)	5/1/2024		$34.35	$22.20	$56.55

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-08475 - Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Roofers (Slate & Tile)	5/1/2023		$35.85	$22.10	$57.95
Roofers (Slate & Tile)	5/1/2024		$37.35	$22.20	$59.55
Sheet Metal Workers	5/1/2025		$62.62	$52.17	$114.79
Sheet Metal Workers	5/1/2026		$65.06	$54.48	$119.54
Sign Makers and Hangars	7/15/2025		$33.48	$26.41	$59.89
Sign Makers and Hangars	7/15/2026		$36.38	$25.01	$61.39
Sprinklerfitters	1/1/2023		$62.23	$31.99	$94.22
Sprinklerfitters	5/1/2025		$70.37	$34.85	$105.22
Steamfitters	5/1/2024		$70.32	$43.09	$113.41
Steamfitters	5/1/2025		$72.52	$44.89	$117.41
Stone Masons	5/1/2025		$50.00	$32.80	$82.80
Stone Masons	5/1/2026		$51.50	$33.80	$85.30
Terrazzo Finisher	5/1/2025		$45.61	$29.41	$75.02
Terrazzo Finisher	5/1/2026		$47.78	$29.61	$77.39
Terrazzo Grinder	5/1/2025		$45.88	$29.41	$75.29
Terrazzo Grinder	5/1/2026		$47.78	$29.61	$77.39
Terrazzo Mechanics	5/1/2025		$52.21	$31.26	$83.47
Terrazzo Mechanics	5/1/2026		$53.36	$32.61	$85.97
Tile Finisher	5/1/2025		$41.17	$30.75	$71.92
Tile Finisher	5/1/2026		$42.07	$31.85	$73.92
Tile Setter	5/1/2025		$52.21	$31.26	$83.47
Tile Setter	5/1/2026		$53.36	$32.61	$85.97
Truckdriver class 1(see notes)	5/1/2024		$36.79	$22.54	$59.33
Truckdriver class 1(see notes)	5/1/2026		$38.57	$23.87	$62.44
Truckdriver class 2 (see notes)	5/1/2024		$36.89	$22.54	$59.43
Truckdriver class 2 (see notes)	5/1/2026		$38.67	$23.87	$62.54
Truckdriver class 3 (see notes)	5/1/2026		$38.92	$23.87	$62.79
Window Film / Tint Installer	6/1/2025		$27.42	$15.13	$42.55
Window Film / Tint Installer	6/1/2026		$28.35	$15.60	$43.95

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-08475 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Bricklayer	5/1/2025		$50.00	$32.57	$82.57
Bricklayer	5/1/2026		$51.15	$34.92	$86.07
Carpenter - Chief of Party (Surveying & Layout)	5/1/2025		$65.96	$30.09	$96.05
Carpenter - Chief of Party (Surveying & Layout)	5/1/2026		$67.52	$30.44	$97.96
Carpenter - Instrument Person (Surveying & Layout)	5/1/2025		$58.39	$29.06	$87.45
Carpenter - Instrument Person (Surveying & Layout)	5/1/2026		$60.09	$29.06	$89.15
Carpenter - Rodman (Surveying & Layout)	5/1/2025		$45.88	$23.19	$69.07
Carpenter - Rodman (Surveying & Layout)	5/1/2026		$46.97	$23.54	$70.51
Carpenter	5/1/2025		$57.36	$30.09	$87.45
Carpenter	5/1/2026		$58.71	$30.44	$89.15
Cement Masons	5/1/2023		$43.20	$32.91	$76.11
Cement Masons	5/1/2025		$46.55	$32.66	$79.21
Dockbuilder, Pile Drivers	5/1/2025		$55.23	$37.99	$93.22
Dockbuilder, Pile Drivers	5/1/2026		$56.98	$37.99	$94.97
Dockbuilder/ Pile driver diver	5/1/2025		$60.31	$44.97	$105.28
Dockbuilder/ Pile driver diver	5/1/2026		$61.88	$45.47	$107.35
Dockbuilder/Pile Driver Diver	5/1/2025		$64.35	$41.74	$106.09
Dockbuilder/Pile Driver Diver	5/1/2026		$66.54	$41.74	$108.28
Dockbuilder/pile driver tender	5/1/2025		$55.23	$37.99	$93.22
Dockbuilder/pile driver tender	5/1/2026		$56.98	$37.99	$94.97
Electric Lineman	6/3/2024		$62.07	$33.96	$96.03
Electric Lineman	6/2/2025		$65.10	$34.45	$99.55
Iron Workers (Bridge, Structural, Ornamental, Precast)	7/1/2024		$53.20	$45.01	$98.21
Iron Workers (Riggers)	7/1/2023		$42.53	$34.14	$76.67
Iron Workers (Rodman/Reinforcing)	7/1/2023		$45.70	$34.77	$80.47
Laborers (Class 01 - See notes)	5/1/2025		$40.20	$27.80	$68.00
Laborers (Class 01 - See notes)	5/1/2026		$41.65	$27.90	$69.55
Laborers (Class 02 - See notes)	5/1/2025		$40.40	$27.80	$68.20
Laborers (Class 02 - See notes)	5/1/2026		$41.85	$27.90	$69.75
Laborers (Class 03 - See notes)	5/1/2025		$40.40	$27.80	$68.20
Laborers (Class 03 - See notes)	5/1/2026		$41.85	$27.90	$69.75
Laborers (Class 04 - See notes)	5/1/2025		$35.00	$27.80	$62.80
Laborers (Class 04 - See notes)	5/1/2026		$36.45	$27.90	$64.35
Laborers (Class 05 - See notes)	5/1/2025		$41.05	$27.80	$68.85
Laborers (Class 05 - See notes)	5/1/2026		$42.50	$27.90	$70.40
Laborers (Class 06 - See notes)	5/1/2025		$41.10	$27.80	$68.90
Laborers (Class 06 - See notes)	5/1/2026		$42.55	$27.90	$70.45
Laborers (Class 07 - See notes)	5/1/2025		$40.95	$27.80	$68.75
Laborers (Class 07 - See notes)	5/1/2026		$42.40	$27.90	$70.30
Laborers (Class 08 - See notes)	5/1/2025		$40.70	$27.80	$68.50
Laborers (Class 08 - See notes)	5/1/2026		$42.15	$27.90	$70.05
Laborers (Class 09 - See notes)	5/1/2025		$40.55	$27.80	$68.35
Laborers (Class 09 - See notes)	5/1/2026		$42.00	$27.90	$69.90
Laborers (Class 10- See notes)	5/1/2025		$40.70	$27.80	$68.50

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-08475 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 10- See notes)	5/1/2026		$42.15	$27.90	$70.05
Laborers (Class 11 -See Notes)	5/1/2025		$40.60	$27.80	$68.40
Laborers (Class 11 -See Notes)	5/1/2026		$42.05	$27.90	$69.95
Laborers (Class 12 -See Notes)	5/1/2025		$42.30	$27.80	$70.10
Laborers (Class 12 -See Notes)	5/1/2026		$42.85	$27.90	$70.75
Laborers (Class 13 -See Notes)	5/1/2025		$44.33	$27.80	$72.13
Laborers (Class 13 -See Notes)	5/1/2026		$45.78	$27.90	$73.68
Laborers (Class 14 -See Notes)	5/1/2025		$40.90	$27.80	$68.70
Laborers (Class 14 -See Notes)	5/1/2026		$41.90	$27.90	$69.80
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2025		$34.07	$19.73	$53.80
Laborers Utility (PGW ONLY) (Flagperson)	5/1/2026		$35.52	$19.83	$55.35
Laborers Utility (PGW ONLY)	5/1/2025		$41.10	$19.73	$60.83
Laborers Utility (PGW ONLY)	5/1/2026		$42.55	$19.83	$62.38
Landscape Laborer	5/1/2024		$30.28	$24.05	$54.33
Landscape Laborer	5/1/2025		$31.73	$24.15	$55.88
Millwright	5/1/2025		$57.39	$35.81	$93.20
Millwright	5/1/2026		$60.20	$35.81	$96.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2025		$54.52	$34.49	$89.01
Operators Class 01 - See Notes (Building, Heavy, Highway)	5/1/2026		$55.67	$35.34	$91.01
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2025		$57.52	$35.38	$92.90
Operators Class 01a - See Notes (Building, Heavy, Highway)	5/1/2026		$58.68	$36.22	$94.90
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2025		$54.27	$34.42	$88.69
Operators Class 02 - See Notes (Building, Heavy, Highway)	5/1/2026		$55.43	$35.26	$90.69
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2025		$57.29	$35.29	$92.58
Operators Class 02a - See Notes (Building, Heavy, Highway)	5/1/2026		$58.44	$36.14	$94.58
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2025		$50.18	$33.22	$83.40
Operators Class 03 - See Notes (Building, Heavy, Highway)	5/1/2026		$51.34	$34.06	$85.40
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2025		$49.88	$33.13	$83.01
Operators Class 04 - See Notes (Building, Heavy, Highway)	5/1/2026		$51.04	$33.97	$85.01
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2025		$48.16	$32.62	$80.78
Operators Class 05 - See Notes (Building, Heavy, Highway)	5/1/2026		$49.32	$33.46	$82.78
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2025		$47.17	$32.33	$79.50
Operators Class 06 - See Notes (Building, Heavy, Highway)	5/1/2026		$48.34	$33.16	$81.50
Operators Class 07 (A) - See Notes (Building, Heavy,	5/1/2025		$66.26	$39.55	$105.81

BUREAU OF LABOR LAW COMPLIANCE
PREVAILING WAGES PROJECT RATES

Project: 26-08475 - Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Highway)					
Operators Class 07 (A) - See Notes (Building, Heavy, Highway)	5/1/2026		$67.73	$40.48	$108.21
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2025		$65.97	$39.46	$105.43
Operators Class 07 (B) - See Notes (Building, Heavy, Highway)	5/1/2026		$67.44	$40.39	$107.83
Painters - Line Stripping	12/1/2024		$44.12	$27.91	$72.03
Painters - Line Stripping	12/1/2025		$45.12	$29.41	$74.53
Painters Class 2 (see notes)	2/1/2025		$50.85	$33.91	$84.76
Painters Class 2 (see notes)	2/1/2026		$51.61	$35.00	$86.61
Painters Class 3 (see notes)	2/1/2025		$61.81	$33.95	$95.76
Painters Class 3 (see notes)	2/1/2026		$62.57	$35.04	$97.61
Pointers, Caulkers, Cleaners	5/1/2025		$51.35	$31.80	$83.15
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2024		$66.80	$42.93	$109.73
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2025		$68.89	$44.73	$113.62
Truckdriver class 1(see notes)	5/1/2024		$36.64	$22.54	$59.18
Truckdriver class 1(see notes)	5/1/2026		$38.42	$23.87	$62.29
Truckdriver class 2 (see notes)	5/1/2024		$36.74	$22.54	$59.28
Truckdriver class 2 (see notes)	5/1/2026		$38.52	$23.87	$62.39
Truckdriver class 3 (see notes)	5/1/2026		$38.77	$23.87	$62.64

SECTION 00 91 00 – ADDENDA

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. The Construction Manager may prepare and issue Addenda during the bidding period as necessary to interpret or clarify the bidding documents, to list approved substitutions of materials or systems, or to change the date and/or time for receipt of bids.
B. Addenda will refer bidders to the affected drawings or section of the project manual and describe the modification, clarification, or correction in writing or by means of supplemental drawings if necessary.
C. Addenda will be serially numbered and dated, identifying the Project, Owner, Construction Manager, and Engineer(s).
D. Addenda will be distributed electronically, by email, or mail to all known bidders at the address furnished by them when bidding documents were obtained. Copies of the Addenda will be distributed at the same time to all parties recorded as having bidding documents on file.
E. Bidders shall not rely on oral instructions made to bidders by any officer, agent, or employee of the Owner, Construction Manager, or Engineer(s).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION 00 91 00

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work performed under Owner's separate contracts.
4. Work sequence.
5. Contractor's use of site and premises.
6. Coordination with occupants.
7. Specification and Drawing conventions.
8. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 01 73 00 "Execution" for coordination of Owner-installed products.

1.03 PROJECT INFORMATION

A. All work furnished under this Project Manual shall be installed at the following location in accordance with the Contract Documents:

B. Project Identification: Pottsgrove High School Facility and Athletic Improvement

1. Project Location: 1301 Kauffman Road Pottstown, PA 19464
2. Applicable County: Montgomery County
3. Applicable Local Municipality: Lower Pottsgrove Township

C. Owner: Pottsgrove School District, 1301 Kauffman Road, Pottstown, PA 19464

D. The provisions of the General Conditions, and Divisions 00, Procurement and Contracting Requirements and Division 01, General Requirements, shall apply to all Work Scopes 1-5, excluding independent Owner contracts.

E. The Work of Work Scopes 1 through 5 includes all work required for complete construction of their Work Scope in accordance with the Contract Documents.

1.04 WORK COVERED BY THE CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. Implement site E&S controls and the detailed sequence of construction.
2. Demolition of existing running track, home side bleachers, and associated buildings as per the demolition drawings.
3. Associated site work including, but not limited to, parking lots, sidewalks, and stormwater management.
4. Construct a new building under the home bleachers, new concessions and restroom building.
5. Install new synthetic turf field with required draining.
6. Install new running track.

B. Project will be constructed under coordinated, concurrent multiple prime construction contracts. See Section 01 12 00, Multiple Work Scope Summary for list of multiple contracts requirements and coordination, including responsibilities of the Project Coordinator. The following Prime Contracts are included in this procurement: Work Scope 1 – General Construction; Work Scope 2 – Electrical Construction; Work Scope 3 – Mechanical Construction; and Work Scope 4 – Plumbing Construction. Work Scope 5 is excluded from this procurement and is separately procured by the Owner. The Bleacher Fabrication and Installation Contract and Scoreboard and Foundation Contract are independent Owner contracts excluded from this procurement.

1. Work Scope 1 – General Construction (Prime Contract)

a. Work Scope 1 – General Construction includes all labor, materials, equipment, supervision, coordination, services, and incidental and complementary Work necessary for the complete construction of the building and associated improvements and for complete and functional installations. This Contract includes Divisions 00 through 12 and 31, 32, and 33, and all Work shown or indicated on the architectural and structural drawings, except Work expressly assigned to another Contract. Work assigned to Work Scope 1 remains included regardless of the drawing discipline or specification section in which it appears.

2. Work Scope 2 – Electrical Construction (Prime Contract)

a. Work Scope 2 – Electrical Construction includes all labor, materials, equipment, supervision, coordination, services, and incidental and complementary Work necessary for the complete construction of the building and associated improvements and for complete and functional installations. This Contract includes Divisions 00, 01, 02, 03, 07, 08, 10, 11, 12, 22, 23, 26, 31, and 33; all Work shown or indicated on the electrical drawings; and all Work assigned to this Contract by the Technology Responsibility Matrix located on the electrical drawings, except Work expressly assigned to another Contract. Work assigned to Work Scope 2 remains included regardless of the drawing discipline or specification section in which it appears.

3. Work Scope 3 –Mechanical Construction (Prime Contract)

   a. Work Scope 3 – Mechanical Construction includes all labor, materials, equipment, supervision, coordination, services, and incidental and complementary Work necessary for a complete and functional installation. This Contract includes Divisions 00, 01, 02, 03, 07, 11, 20, 23, and 25, and all Work shown or indicated on the mechanical drawings, except Work expressly assigned to another Contract. Work assigned to Work Scope 3 remains included regardless of the drawing discipline or specification section in which it appears.

4. Work Scope 4 – Plumbing Construction (Prime Contract)

   a. Work Scope 4 – Plumbing Construction includes all labor, materials, equipment, supervision, coordination, services, and incidental and complementary Work necessary for the complete construction of the building and associated improvements and for complete and functional installations. This Contract includes Divisions 00, 01, 02, 03, 07, 11, 12, 21, 22, 31, and 33, and all Work shown or indicated on the plumbing and fire protection drawings, except Work expressly assigned to another Contract. Work assigned to Work Scope 4 remains included regardless of the drawing discipline or specification section in which it appears.

C. The following contracts are excluded from this procurement and are being separately procured by the Owner: (1) Bleacher Fabrication & Installation Contract, (2) Scoreboard and Foundation Contract, (3) Work Scope 5 – Site and Athletic Improvements. Work Scope 5 is excluded from this procurement but remains part of the coordinated Work Scope structure. The Bleacher Fabrication and Installation Contract and Scoreboard and Foundation Contract are separately procured independent Owner contracts.

1. Work Scope 5 – Site and Athletic Improvements (Separately Procured Owner Contract / Project Coordinator)

   a. Work Scope 5 – Site and Athletic Improvements, a separately procured Owner Contract, includes all labor, materials, equipment, supervision, coordination, services, and incidental and complementary Work necessary for the complete construction of the site, athletic fields, and associated improvements and for complete and functional installations. This Contract includes Divisions 00, 01, 02, 03, 04, 10, 31, 32, and 33; site work, demolition, athletic components, and related activities; and all Work shown or indicated on the civil and demolition drawings, except Work expressly assigned to another Contract. Work assigned to Work Scope 5 remains included regardless of the drawing discipline or specification section in which it appears.

1.05 WORK UNDER SEPARATE CONTRACTS

A. Work Scope Procured Separately

1. Owner has awarded or will award separate contract(s) for the following construction operations at the Project site. Those operations will be conducted simultaneously with work under this Contract.

    a. The Site and Athletic Improvements Contract (Work Scope 5)

2. The Site and Athletic Improvements Contract (Work Scope 5) shall be subject to the General Conditions, Supplementary Conditions, applicable Division 01 requirements, insurance requirements, administrative procedures, coordination requirements, and Project schedule requirements, except as modified by its Owner-Contractor Agreement. This work is not part of the Prime Contractors being bid under these documents.

3. The Site and Athletic Improvements Contractor shall serve as the Project Coordinator and shall be responsible for the site construction activities outside of the building footprint, except where specifically assigned to a Prime Contract. Prime Contractors shall cooperate and coordinate their Work with the Project Coordinator and the separate Owner contractor as required for a complete project.

B. Independent Owner Contracts

1. Owner has awarded or will award separate contract(s) for the following construction operations at the Project site. Those operations will be conducted simultaneously with work under this Contract.

    a. Owner-Procured Bleacher Fabrication and Installation Contract

    b. Owner-Procured Scoreboard and Foundation Contract

    c. Construction Testing and Special Inspections Contract

2. The Owner’s contracts for bleacher fabrication and installation, scoreboard and foundations, and construction testing and special inspections are independent Owner contracts. These contracts are not Prime Contracts under this procurement and are not subject to the Prime Contract requirements unless expressly incorporated into their respective agreements. Independent Owner contracts are not Work Scopes and are governed solely by their respective agreements, except for expressly stated coordination obligations. Coordination does not transfer responsibility for another contractor’s means, methods, safety precautions, delays, defects, omissions, or contractual performance.

3. Prime Contractors and the Work Scope 5 Contractor shall coordinate with these Owner-contracted entities as required for complete and timely execution of the Project.

4. Cooperate fully with Owner and separate Owner-hired firms and/or agencies so work may be carried out smoothly, without interfering with or delaying Work under this Contract. Coordinate the Work of this Contract with work performed under Owner's separate contracts.

5. The Owner will procure and bear costs for only the following under the Construction Testing and Special Inspections Contractor: field testing for earthwork, concrete, masonry, asphalt and concrete paving, fireproofing and firestopping, and structural steel.

1.06 OWNER-FURNISHED PRODUCTS

2. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products. The Work includes providing support systems to receive Owner's equipment and making plumbing, mechanical, and electrical connections. Owner furnished products also includes existing items to be relocated by the Contractor (OFCR).

    1. Owner will arrange for and deliver Shop Drawings, Product Data, and Samples to Contractor.
    2. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule.
    3. After delivery, Owner will inspect delivered items for damage. Contractor shall be present for and assist in Owner's inspection.
    4. If Owner-furnished items are damaged, defective, or missing, Owner will arrange for replacement.
    5. Owner will arrange for manufacturer's field services and for delivery of manufacturer's warranties to Contractor.
    6. Owner will furnish Contractor the earliest possible delivery date for Owner-furnished products. Using Owner-furnished earliest possible delivery dates, Contractor shall designate delivery dates of Owner-furnished items in Contractor's Construction Schedule.
    7. Contractor shall review Shop Drawings, Product Data, and Samples and return them to Architect noting discrepancies or anticipated problems in use of product.
    8. Contractor is responsible for receiving, unloading, and handling Owner-furnished items at Project site.
    9. Contractor is responsible for protecting Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
    10. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
    11. Contractor shall install and otherwise incorporate Owner-furnished items into the Work.

3. Owner-Furnished Products:

1. Security cameras and equipment provided by the Owner will be installed by owner's vendor. The Electrical Prime Contractor will provide the infrastructure as per the drawings.
2. Residential Appliances
3. Toilet Room Accessories: Including but not limited to - paper, paper towel, and soap dispensers in all toilet rooms and in other areas as noted. Owner provided. Installation by the GC.
4. Other items as noted on the drawings.

1.07 CONSTRUCTION SCHEDULE

2. Scheduling of Work and Time of Completion is an essential condition of this Contract. The entire Work shall be completed in compliance with the Project milestone completion dates listed. Any deviations from these requirements shall be subject to the approval of the Construction Manager.
3. Liquidated damages apply for all phased completion dates and milestone completion dates shown on the Phasing Drawings. The Owner reserves the right to enforce liquidated damages for contractor's non-compliance with any of the phasing, milestone, and substantial completion dates.
4. The Notice to Proceed will be issued as noted on the Phasing Plan(s).
5. Completion for each phase and milestones are noted on the Phasing Plan and must be strictly complied with.
6. Completion of all contracts is as follows:

    1. Substantial Completion:
        a. Concessions/Restroom Buildings August 9, 2027
        b. New Bleachers & Pressbox August 16, 2027
        c. Site August 27, 2027
        d. Facilities Buildings September 30, 2027

    2. Project Final Completion: October 29, 2027

7. See Phasing Plan(s) for milestone dates. The contractors' sequence and CPM schedule shall incorporate all milestone dates and comply with all dates noted therein for completing the Project. The dates provided are the milestone completion dates which will be enforced. All building systems are to be installed in compliance with the milestone dates identified on the Phasing Plans.
8. Construction work shall be performed in a sequence to ensure that all building systems are systematically installed in an efficient manner. The mechanical and electrical rooms shall be constructed in an early sequence to permit rough-in by the Mechanical, Electrical, and Plumbing trades and to ensure proper operation of life safety systems in occupied areas of the building in the timeframes identified on the Phasing Plans.
9. If the Notice to Proceed or a required permit or an approval from an approval agency that is required for Start of Work is delayed for any reason beyond the control of any Prime Contractor that prevents the Contractor from Performing Work, the Owner, in consultation with the Construction Manager, may adjust the applicable Milestone Completion Dates, Phased Completion Dates, and Contract Time as deemed appropriate to account for the delay. The Contractor is not entitled to damages for delay of any type on this contract. Contractor agrees an extension of time is the only

resource as a result of any delays that are beyond the Contractor's control.

10. If a specific milestone or phased completion date is delayed for any reason beyond the control of any Prime Contractor that prevents the Contractor from performing Work, and the delay impacts subsequent milestone and phased completion dates, remaining milestone and phased completion dates will be adjusted by the exact same number of days.
11. All Work must be completed in accordance with the Phasing Drawings, the Project NPDES permit requirements for stormwater discharges associated with construction activities issued under Chapter 102 by the Department of Environmental Protection (DEP) and authorized county conservation districts (CCDs), the approved Project schedule, and in a sequence approved by the Architect, Engineer, and Owner. Each prime contractor shall complete and submit required Visual Site Inspection Reports (VSIRs) and other DEP compliance documentation in compliance with the Owner's NPDES permit and DEP requirements and shall submit the appropriate application forms to the appropriate County Conservation District.

1.08 RESPONSIBILITY OF THE CONTRACTOR

2. The Contractor shall be responsible for the scheduling and general management of the work of the project and for the acts and omissions of all of their employees; all subcontractors, their agents and employees; and all other persons performing any of the work under a contract with the Contractor.
3. The Contractor will have supervision on site full-time during the duration of the project for their respective scope of work. The Supervisor must be on site while all work is in process.
4. The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work.
5. The Contractor shall supervise and direct the work, using their best skills and attention. They shall be solely responsible for all construction means, methods, techniques and procedures and for coordination of all portions of the work under this Contract.
6. The Contractor shall accept the project as it exists. All existing conditions, whether or not specifically noted on the Contract Documents, shall be verified by the Contractor in-person prior to the start of work.
7. The Contractor shall not proceed with any items of the work, which are reasonably questionable without consulting the Construction Manager.
8. Contractor's questions regarding this project must be directed to the Construction Manager. The Owner's employees are not authorized to make decisions or give direction regarding any aspect of this project. Consult CMTA employees involved on the project only. You can find these people on Procore in the directory. These employees will be identified in the Pre-Construction Meeting.
9. Construction Limits: Except as specifically indicated or as may be necessary to complete the work under the Contract, activities of the Contract shall be limited to within the limits designated on the drawings.
10. Testing:

    1. Contractors are to perform all factory, Source Quality Control, or shop testing and any other testing required.
    2. Contractors are to perform any field testing of electrical systems or data wiring systems.

3. Contractors are to perform testing of above or below ground pipes, ductwork, and mechanical systems including pressure, air, water, or vacuum testing required.
4. Contractors are to perform any other field testing that may be required by Specification Divisions 02-33 or not included by the Owner's Testing Agent.
5. All contractor testing shall be performed in the presence of the Construction Manager and/or (if required) in the presence of the municipal agency having jurisdiction.

11. The Contractor responsible for installation of the systems and equipment is responsible for commissioning each system. The minimum commissioning requirements in accordance with specific project requirements, including coordination and verification, shall be the responsibility of the Contractor.
12. Construction Waste Management for demolition work and any site features is by the Contractor performing the Work.
13. Local Municipal Approvals & Permits: The Contractor shall be responsible for the final completion of the permit applications and coordinating the submission of the permit application. The Owner will pay for the building permit. The Contractor shall secure and pay for all necessary administrative costs, insurances, business privilege licenses, certifications, or taxes to apply for the necessary permits required to perform the Work.
14. Contractors must obtain all necessary state, county, or local municipal approvals prior to substantial completion.
15. Prior to acceptance as substantially complete, all general construction, all mechanical, electrical, and plumbing systems shall be complete, fully operational, tested as required, inspected by approval authorities, and certified complete.

1.09 USE OF BUILDING BY OWNER

2. Owner reserves the right to let other contracts in connection with this Project or in connection with existing buildings. Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and execution of their work and shall properly connect and coordinate his work with theirs. Cooperate fully with Owner and separate Owner-hired firms and/or agencies so work may be carried out smoothly, without interfering with or delaying Work under this Contract.
3. Owner reserves the right to jointly occupy the premises with the Contractor in the performance of his duties and functions. The Owner also reserves the rights to: enter into the Project and premises at all times; make installations or removal of materials and equipment at appropriate times as the Work progresses; and install or remove equipment, furniture, and furnishings when spaces are at appropriate stages of completion. Contractor shall coordinate work with the Owner and cooperate with the Owner to minimize undue interferences.
4. If any part, unit, phase, or the entire Project is substantially complete or ready for occupancy, the Owner may, upon notice to the Contractor, enter into and make use of the Work that is substantially complete.

5. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.

    1. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed.

On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.

1.10 CONTRACTOR'S USE OF PREMISES

2. General: During the construction period, the Contractor shall have limited use of the premises for construction operations as shown in the project plans. The Contractor's use of the premises is limited by the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project, and by the Owner's right to continue daily school operations. The Contractor must coordinate activities and cooperate with adjacent uses including any of their construction activities. Contractor must also schedule, coordinate, and perform construction activities to avoid disruption of ongoing operations. Contractor must schedule and perform certain work on weekends and holidays to avoid disruptions. This may include street and utility work.

    1. The site is currently occupied as a High School and such daily activities/functions revolving around the educational process, cannot be interrupted and must be considered in the scheduling of work for this project. The Contractor is responsible to make accommodations to not disrupt regular school activities/functions, such as: (arrival/dismissal, physical education, etc.). In addition, the Contractor is required to provide adequate safety measures and separation of any and all, construction activities.
    2. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.
    3. Keep driveways and entrances serving the premises clear and available to the Owner at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.
    4. Site Protection: Protect existing trees and other plantings which are not to be removed, and paved surfaces which are to remain and are susceptible to damage from ordinary operations of the Contractor, trucking or other activity. Provide appropriate safety signage and barricades to keep unauthorized person(s) out of the project area.

3. Restoration: All improvements on or about the site and adjacent property which are not shown to be altered, removed or otherwise changed, and which have been damaged or disturbed by any work or operations under this contract, shall be restored to the conditions which existed previous to starting work. All features labeled to remain shall be protected from damage by any operation in connection with the Project. The Contractor shall replace or repair, at their own expense (and to the satisfaction of the Owner), all damage to existing drives, lawns, plants, trees, shrubbery and other property resulting from work of this Contract, from whatever cause.
4. Interior Protection: Each contractor/ Work Scope is responsible to protect existing facility and components/ materials. Flooring shown not to be removed must be covered with poly and high traffic areas should be covered with poly and Masonite to protect the existing flooring. The flooring protection must be monitored and corrected if showing signs of deterioration. If damage occurs, that contractor will be responsible to clean

and if that is not sufficient it will be replaced by the contractor at their expense. Contractor is to cover owner items with poly while construction activity is taking place in that room, i.e.; book shelves, desks, etc. When working in a clean room, i.e.; computer lab or data closet, contractor is to maintain cooling, and dust free environment as to not damage equipment, Temporary enclosures may be needed to protect equipment.

END OF SECTION 01 11 00

SECTION 01 12 00 – MULTIPLE WORK SCOPE SUMMARY

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
B. Specific requirements for Work of each contract are also indicated in individual Specification Sections and on Drawings.
C. Related Sections include the following:

1. Division 00 Section “Safety” for responsibilities of individual Prime Contractors’ Health and Safety Plans including disease communication protocols established by CDC and OSHA.
2. Division 01 Section 01 11 00 "Summary of Work" for the Work covered by Contract Documents and for overall work sequence and for work restrictions for use of the Project site and for requirements for continued Owner occupancy of premises.
3. Division 01 Section 01 31 00 "Project Management and Coordination" for general coordination requirements.
4. Division 01 Section 01 31 17 “Coordination Drawings” for specific drawing coordination requirements and responsibilities.
5. Division 01 Section 01 50 00 "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.

1.03 CONTRACT REQUIREMENTS APPLICABLE TO ALL WORK SCOPES

A. Comprehensive Scope of Work: Provide labor, material, and equipment necessary to properly execute the work of this Work Scope in accordance with Contract Documents and specifically the specifications sections listed herein.

1. Contract Documents are complimentary and what is required by one shall be as binding as if required by all. i.e., bi-weekly site clean-up from all contractors of work areas.
2. Each contractor is responsible for the general, civil, structural, architectural, mechanical, and electrical notes as they relate to your Work.
3. It is the intent of this Work Scope and responsibility for this contractor to provide a complete operational assembly/system, unless specifically indicated below.

4. Review the entire project so that proceeding, concurrent, and succeeding work of other contractors can proceed without harm to the Project as a whole.
5. Each contractor is required to coordinate their work with other contractors, as directed by the Construction Manager, without additional compensation.
6. By submitting your Proposal/Bid, each contractor acknowledges they have reviewed all appropriate contract documents, including previously issued documents and have anticipated, based on information provided or available, impact of future Work as it affects their Work Scope Category.
7. Construction Cleaning: Each Work Scope is responsible for clean-up of debris, rubbish and other similar items resulting from their operations on a daily basis.

B. Contract Scope and Assigned Responsibilities:

1. Anything contained in the Contract Documents designated as "by General Contractor", “Contractor”, or similar terms, shall be by the Contractor performing the same work as so designated by the work scope delineation.
2. Local Trade union jurisdictional settlements do not control the scope of work included in a Work Scope, and Work Scopes do not delineate jurisdictional portions of work. In case a jurisdictional dispute arises, the contractor shall be responsible for any associated cost of the “Claimed” work.
3. When a potential jurisdictional dispute or similar interruption of construction activities is identified, affected contractors shall promptly negotiate a reasonable settlement with the Construction Manager and affected parties to avoid or minimize interruption and delays.
4. Unless otherwise indicated, Work Scopes include a complete section of Work, including but not limited to labor, materials, equipment, scaffolding, hoisting, applicable permits and taxes as required by the Contract Documents.

C. Clarification: The Specifications are written in imperative and abbreviated form.

1. It shall be clearly understood that all imperative statements are directed at the subcontractor responsible for that portion of the Work, unless specifically indicated otherwise.
2. Incomplete sentences shall be completed by inserting “shall”, “contractor shall”, and similar mandatory phrases by inference in the same manner as they are applied to notes on Drawings.
3. The words “shall be” shall be supplied by inference where a colon is used within sentence or phrases.
4. Where stated “Provide” in Work Scopes. Provide equals furnish and install.
5. Each Contractor is responsible for the protection of their work.
6. Temporary Facilities and Controls: See specific responsibilities for temporary facilities and controls indicated in Division 01 Section "Temporary Facilities and Controls," and as noted on the Contract Documents.
    a. Temporary enclosures of window and door openings will be completed as outlined in Section 01 50 00.
    b. Fire Extinguishers and appropriate signage will be supplied as per Section 01 50 00.

D. Interpretations or Corrections of Contract Documents: Carefully study and compare Documents with each other and with other work being performed concurrently or presently under construction to the extent that it relates to the Work for which this Contract is awarded. Contractor shall examine the site and local conditions and shall at once report to the Construction Manager inconsistencies or ambiguities discovered or requirements not understood.

1. Using Request for Information (RFI) on the web-based project management platform (Procore, as provided by THE CM), contractors shall submit to THE CM Request for Information prior to performing work in question.
2. The Contractor will forward Request for Information on form acceptable to Owner, Architect, and Construction Manager prior to performing work in question. All RFIs should be submitted though Procore.
3. Responses provided to an RFI by Owner, Architect or Construction Manger are intended to be clarifications only and are not an authorization for a Contract Time extension or an increase in the Contract Amount.
4. If the contractor believes the response is a change in either Contract Time or Contract Amount, contractor shall comply with requirements of the Owner/Contractor Agreement.
5. Request for Information (RFI's) agreed to by Owner and ICS that change either the Contract Time or Contract Amount will be included in an appropriate Change Order prior to performing work in question.

E. Conflicts and Duplication in Work: In the case of a duplication of scope responsibility either on Drawings, Specification, or Work Scope Descriptions, Contractor is responsible to bid the work as called out regardless of potential oversight duplications.

1. In the case of duplication, the Construction Manager will make the final decision as to which Work Scope will do the work and the appropriate cost adjustment will be made.

1.04 SCOPE CLARIFICATIONS APPLICABLE TO ALL WORK SCOPE CATEGORIES

A. Extent of Contract: Unless the Contract Documents contain a more specific description of the Work, names, and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.

1. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
2. Local custom and trade-union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
3. Trenches for the Work of each contract shall be provided by each contract for its own Work unless noted otherwise.
4. Cutting and patching for the Work of each contract shall be provided by each contract for its own Work except where indicated otherwise on the Drawings or Specifications. Refer to Section 01 73 29 Cutting and Patching.

5. Firestopping for the Work of each contract shall be provided by each contract for its own Work.
6. Submit schedules showing construction operations sequenced and coordinated with overall construction and provide all scheduling and coordination information required for the complete scope of work.

B. Special Coordination and Scheduling Required: Contractor acknowledges that the performance of this Work Scope must be closely interfaced with the performance of others and that multiple mobilizations will be required.

1. It is understood that punctuality and compliance with agreed-upon deliveries is of the essence on the Project.
2. Comply with Project Schedule and ensure preparatory work of other trades are erected first or carried forward simultaneously where installation sequence requires it.
3. Contractor shall provide reasonable notice of its intentions to those affected, and if other contractors, after such reasonable notice, fail to have their work in readiness, Construction Manager shall be consulted, and their directions followed.
4. Where indicated or required to maintain Project Schedule or to accommodate Owner's on-going operations, provide required "after-hours" shift work to maintain Project Schedule. It is the contractor's responsibility to properly staff and accommodate where necessary to maintain the schedule. Overtime work by each contractor necessary to conform with these requirements shall be considered a normal practice under this contract. No claims for additional compensation will be accepted by the Owner.

1.05 COORDINATION

A. Project Coordinator shall be responsible for coordination between the General Construction Contract, Plumbing Contract, HVAC (also referenced as Mechanical) Contract, and Electrical Contract.

1. Site and Athletic Improvements Contractor shall act as and assume responsibilities of Project Coordinator which are designated throughout the Contract Documents.

B. General Contractor, HVAC, Plumbing/Fire Protection and Electrical Coordinators, who shall be subordinate to Project Coordinator, shall be responsible for coordination between the General Contract, Plumbing Contract, HVAC Contract, and Electrical Contract. The HVAC Contractor shall be responsible for the assembly of coordination drawings for himself and the inclusion of coordination drawings provided by the Electrical and Plumbing Contractors. The HVAC (Mechanical) Contractor shall be the primary M/E/P coordinator and shall be responsible for the preparation of AutoCAD electronic coordination drawings between HVAC, plumbing, and electrical trades. The Plumbing and Electrical Contractors shall provide such information electronically to fully coordinate their work with that of the other primes and in the format requested by the HVAC Contractor. All Prime Contractors shall cooperate and be responsible for preparation and compliance with coordination drawings. See Section 01 31 17 for requirements for all Prime Contractors.

C. Project Coordinator shall coordinate all work in accordance with project phasing requirements and scheduled activities of all other contractors. GC shall perform cutting and patching of all roofing materials including metal deck. Any structural reinforcement required is by the General Contractor.

D. The GC shall be responsible to maintain watertight conditions between the roof and curbs, pipes, and conduits for both permanent and temporary flashing. The MC, PC, and EC shall be responsible for providing temporary enclosures that are watertight for all roof penetrations and openings that are part of their scope in order to maintain watertight conditions beyond the roofer's flashings.

1.06 PROJECT COORDINATOR RESPONSIBILITIES

A. Project Coordinator: Full-time Project Coordinator shall be experienced in administration and supervision of site and athletic improvements construction, including building, HVAC, plumbing, and electrical work.

1. Coordination activities of Project Coordinator include, but are not limited to, the following:

a. Provide overall coordination of the Work.
b. Coordinate shared access to workspaces.
c. Coordinate product selections for compatibility.
d. Provide overall coordination of temporary facilities and controls.
e. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
f. Coordinate construction and operations of the Work with work performed by each Contract.
g. Prepare Coordination Drawings to coordinate work by more than one contract except for HVAC, electrical, and plumbing coordination drawings which are the responsibility of the respective Contractors and primarily the HVAC Contractor.
h. Coordinate sequencing and scheduling of the Work. Include the following:
i. Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
j. Prepare a combined Contractor's Construction Schedule for entire Project. Base schedule on Project Milestone Schedule. Secure time commitments for performing critical construction activities from contractors. Show activities of each contract on a separate sheet. Prepare a summary sheet indicating combined construction activities of contracts.

1) Submit schedules for approval.
2) Distribute copies of approved schedules to Architect, Construction Manager, Owner, and contractors.

k. Provide quality assurance and quality-control services specified in Section 01 40 00 "Quality Requirements."
l. Coordinate sequence of activities to accommodate tests and inspections and coordinate schedule of tests and inspections.

m. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
n. Perform field engineering, construction layout, and locate existing permanent benchmarks and control points. Provide similar reference points and establish permanent benchmarks, control points, and elevations on project site for use by other prime contractors and all trades.
o. Provide field surveys of in-progress construction and site work.
p. Progress cleaning of site shall be performed on a daily basis. Site cleaning shall include removal of mud and debris from all areas and in particular all sidewalks and streets.
q. Coordinate cutting and patching.
r. Coordinate protection of the Work.
s. Coordinate completion of interrelated punch list items.
t. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
u. Collect Record Specification Sections from other contractors, collate Sections into numeric order, and submit complete set.
v. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

2. General Construction, HVAC, Plumbing, and Electrical Coordinators: Full-time General Construction, HVAC, Plumbing, and Electrical Coordinators shall be experienced in coordination of building, HVAC, plumbing, and electrical construction, including coordination of type of operations required for this Project.

a. Coordination activities of Building, HVAC, Plumbing, and Electrical Coordinators include, but are not limited to, the following:
b. Schedule and sequence HVAC, plumbing, electrical, and general construction activities.
c. Coordinate sharing access to workspaces by HVAC, electrical, and plumbing contractors.
d. Coordinate integration of HVAC, electrical, and plumbing work into limited spaces.
e. Coordinate protection of HVAC, electrical, and plumbing contractors' work.
f. Coordinate cutting and patching for HVAC, electrical, and plumbing work.
g. Prepare HVAC, electrical, and plumbing Coordination Drawings.
h. Coordinate tests and inspections for HVAC, electrical and plumbing work.
i. Coordinate HVAC, electrical, and plumbing temporary services and facilities.
j. Refer to Section 013117, Coordination Drawings for specific requirements.

B. Submittal and Fabrication Time Requirements: In accordance with Part 1 of individual specification sections requiring Submittals and Division 01 requirements: coordinate, prepare, and submit a complete package of design submittals in accordance with the Project Schedule and requirements of the Subcontract Agreement.

1. Schedule Requirements for Design Submittals: Durations will be mutually agreed to between the Construction Manager, Architect and this contractor for the task identified herein and will be specifically listed within the Agreement.

a. Preparation of Design Submittals.
b. Fabrication and Delivery Time.
c. Duration of On-Site Installation.

2. For items requiring “design submittals” prepare submittals for review and acceptance by the A/E to comply with the milestone dates outlined within the Project Schedule and Agreement.
3. For items NOT requiring “design submittals” and upon return of approved submittals for those items requiring submittals, fabricate and deliver items to Site to comply with Project Schedule and Agreement.

C. Document Management and Control Procedures: Ensure on-site contractor’s personnel have current contract documents, including, but not limited to: Specifications, Drawings and clarifications (RFI’s and ASI’s) and other modifications (PR’s and field orders) affecting the Work.

1. Contractor is responsible to copy and distribute (at their cost) sufficient copies of documents to contractor’s personnel, vendors, and suppliers.
2. Ensure field personnel are familiar with requirements of Contract Documents.
3. Contractor to have an established document control procedure to ensure compliance.

D. Coordinate Layout and Clearances: Coordinate space requirements and installation for items that are indicated diagrammatically on Documents.

1. Follow routing indicated for pipes, ducts and wiring, place runs parallel with line of building. In finished areas, unless expressly indicated otherwise, conceal pipes, ducts and wiring within construction. Coordinate locations of plumbing and electrical fixtures and electrical outlets with finish elements.
2. Use space efficiently to maximize accessibility for other installations, maintenance, and repairs.
3. Installing entities shall modify their installations, if needed, to eliminate conflicts and achieve effective coordination of systems and work.
4. Contractor’s failure to exercise coordination responsibilities constitutes a waiver of claims for an increase in Contract Sum if design modifications are required to resolve conflicts that might have been avoided by complying with requirements of this Section and the overall provided schedule.

E. Field Verification of Existing Conditions and Substrates: Inspect existing conditions and substrates to receive work prior to installation, field verify dimensions that will affect the layout or performance of your work, and confirm preparatory work is complete and acceptable to receive work of this Work Scope.
F. Professional Errors and Omission Insurance Requirements: Where Work Scope Categories included requirements for “Delegated Design”, “third party engineering”, “Signed Shop Drawings by licensed engineer”, or “submission of design calculations” as part of the individual specification sections or structural notes, refer to Insurance Requirements in the General Conditions for additional requirements.
G. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.

H. The Contractor responsible for installation of the systems and equipment is responsible for commissioning each system. The minimum commissioning requirements in accordance with specific project requirements, including coordination and verification, shall be the responsibility of the Contractor.

1.07 MULTIPLE PRIME COORDINATION CLARIFICATIONS

A. Site and Athletic Improvements Contractor is responsible for all demolition. The disconnection and/or reconnection of existing equipment within the buildings shall be by the Plumbing/ HVAC/ Electrical Contractor as applicable.

B. Concrete clarifications - GC is responsible for all concrete within the building footprint, with the exception of any mechanical, electrical, plumbing, fire suppression pads or bases if required. The Site and Athletic Improvements Contractor is responsible for all concrete outside of the building including but not limited to the site wall footings, with the exception of the site light bases and stadium light bases which are provided by the Electrical Contractor.

C. During placement of concrete slabs, each Prime Contractor that has rough-in requirements in the slab shall provide on-site personnel while slabs are being poured to direct, supervise, locate, mark, and configure rough-in requirements. Sleeves required for floor, wall, and roof penetrations shall be furnished and installed by the Prime Contractor(s) that require the sleeves. The Prime Contractor using the sleeves is responsible for installing sealant, fire-safing, and/or escutcheons necessary for a finished installation.

D. Plumbing, HVAC, and Electrical Contractors shall provide miscellaneous steel members for support of hanging systems installed under their contract and shall reinforce joists for non-panel point concentrated loads. When run parallel to joists, hanging systems shall be supported from steel installed perpendicular to joists and spanning a minimum of three (3) joists. All miscellaneous steel required shall be provided by contractor installing the systems under their contract; do not use joists for support. Supporting from metal roof deck and deck systems is prohibited where indicated in the Contract Documents.

E. All roofing work will be performed by GC:

1. GC shall coordinate all work in accordance with project phasing requirements and scheduled activities of all other contractors. GC shall perform cutting and patching of all roofing materials including metal deck. Any structural reinforcement required is by the General Contractor.
2. Reference Article 1.05.B of this Section for additional requirements.

F. GC and Roofing Subcontractor are responsible up to curb flashings. The HVAC Contractor shall layout all openings and curbs and shall furnish all fully assembled roof curbs to GC for installation. GC shall provide all blocking and accessories to install curb(s). Roofing subcontractor will provide all permanent roofing and flashing to the curbs. Responsibilities for maintaining water tight conditions shall be as follows:

1. The GC shall be responsible to maintain watertight conditions between the roof and curbs, for both permanent and temporary flashing.
2. HVAC Contractor is responsible to seal any temporary or permanent equipment openings and install new equipment keeping the opening watertight at all times.

3. Each Prime Contractor shall be responsible to seal all pipes, conduits, or roof openings and penetrations associated with their Work.

G. General Contractor shall apply sealant around wall mounted outside air intake louvers provided and installed by the HVAC Contractor.

H. Where fireproofing is indicated for the project, each Prime Contractor shall install clips, hangers, supports, sleeves, runners, and other items required prior to installation of fireproofing. Each Prime Contractor shall protect fireproofing material; damages to fireproofing shall be repaired by the General Contractor and charged to the Prime Contractor responsible for the damage; this includes items installed out of sequence.

I. General Contractor shall furnish and install all lintels and structural supports required for openings and recesses in new and existing construction to allow the passage of the Work of his Contract and the Work of the Plumbing/Fire Protection, HVAC, and Electrical Prime Contracts.

J. General Contractor shall also provide chases and openings 12” x 12” or larger for equipment in new construction, including all roof areas, as directed, supervised, located, marked, and configured within the project structure, by the Plumbing, HVAC, and Electrical Prime Contractors' personnel on site. These openings shall be sealed by the prime contractor requiring the opening. All sleeves, conduits, and sealing of the same shall be furnished and installed by the prime contractor that requires the access for installation of systems. Roofing Subcontractor to the GC shall perform cutting and patching of roof materials as directed by the other Prime Contractors for the implementation of their work.

K. Prime Contractors who fail to properly coordinate their work in new construction work and whose work requires an opening, or recess, in completed construction shall be responsible to provide that alteration; to furnish and install lintels and structural supports required; and to patch the construction to match the completed unaltered.

L. Plumbing, HVAC, and Electrical Prime Contracts shall furnish any access panels which are required for access to their work. Coordinate opening requirements with the General Contractor for installation by GC.

M. HVAC Contractor to furnish and install all exterior vents and louvers.

N. Plumbing Contractor to provide all fixtures, traps, etc. to provide all installation and final connections of sinks, faucets, and fittings. Coordinate this work with the General Contractor as provided in the Contract Documents.

O. Plumbing Contractor shall make final connections and shall provide valved connections to make-up water feeders to loop water system and dual temperature system, as indicated.

P. Plumbing Contractor shall provide plumbing water supply system within building and underground to a point five feet outside the building perimeter and shall make final connection to water supply system. The Plumbing Contractor shall provide fire suppression system within building and underground to a point five feet outside the building perimeter, unless noted otherwise, and shall make final connection to water supply system.

Q. HVAC and Plumbing Contractors shall provide control interlock wiring for their associated system equipment.

R. The HVAC Contractor is defined herein to include the work of the Mechanical Contractor, H.C., M.C., ATC Sub-Contractor, and/or BAS Contractor.

S. The HVAC Contractor shall provide wiring, fiber, and data cable between all Ethernet Network Controllers Standalone Digital Control Units, workstations, software, sensors, transducers, relays, valves, dampers, damper operators, control panels, and other

accessory equipment, along with a complete system of electrical interlocking wiring to fill the intent of the specification and provide for a complete and operable system as specified in Division 23.

T. The Electrical Contractor shall provide electric power wiring to new plumbing and HVAC equipment. HVAC Contractor shall provide electric power wiring and control wiring for ATC equipment and devices.

U. The Electrical Contractor shall furnish duct smoke detectors. The Mechanical Contractor shall install duct detector in ducts. The Electrical Contractor shall wire the duct smoke detectors to the fire alarm system. The Electrical Contractor shall provide fire alarm relays adjacent to the mechanical equipment, and the Mechanical Contractor shall wire to the ATC/BAS system to de-energize the fan.

V. The Electrical Contractor shall provide the kW/KWH transducer specified at each secondary metering location. The HVAC contractor shall provide control wiring to the points specified.

W. The Electrical Contractor shall provide auxiliary contacts on generator/transfer switch as required in the points list in Division 23. The HVAC Contractor shall provide control wiring to the points.

X. The Electrical Contractor shall lock out and tag circuit breakers and switches and shall check cables and wires to ensure they are de-energized to ground potential before Work begins.

Y. Electrical Contractor shall provide disconnect switches for HVAC and Plumbing system equipment except where such items are factory installed as an integral part of the equipment.

Z. Electrical Contractor shall provide manual motor starters, or magnetic motor starters, for HVAC and Plumbing equipment except where such equipment is provided with factory installed starters as an integral part of the equipment or equipment control panel. Variable frequency drives shall be an integral part of HVAC equipment and HVAC variable speed pumping package.

AA. Electrical Contractor shall provide fuses for disconnects and disconnect/starter switches. HVAC and Plumbing Contractors shall furnish the Electrical Contractor with required motor data to properly size and select fuses and overload protection in accord with the National Electrical Code requirements. HVAC and Plumbing Contractors shall furnish to the Electrical Contractor the equipment manufacturers' circuit protection data.

BB. Security system equipment and installation to be completed by the school district vendor. Infrastructure for the security system are by the EC. Refer to the Technology Responsibility Matrix.

CC. Plumbing/Fire Protection Contractor to coordinate tie-in of sprinkler system to fire alarm system with Electrical Contractor. Plumbing Contractor to provide flow and tamper switches for connection to fire alarm system.

1. Plumbing Contractor shall provide plumbing water supply systems within each building and shall make final connection to water supply systems at the Site Contractor provided flanges. Coordinate location of water entrances with PC.
2. Plumbing Contractor shall provide all connections and plumbing water supply systems within the building and shall make final connection at the Site Contractor supplied pipe. Coordinate location of pipe entrances with PC.

DD. Plumbing Contractor shall provide sanitary and storm system within building, including open air enclosed courtyards, and underground to a point five feet outside the building

perimeter, unless noted otherwise, and shall make final connection to storm and sanitary system.

1. Site Contractor shall provide gravity sewer line from 5' outside of the building to manhole or holding tanks as noted on civil drawings. Site Contractor to provide and install all cleanouts and covers outside of the building. Plumbing Contractor to provide sewage ejector and piping to 5' outside of the building and final connection to the gravity sewer line.
2. General Contractor shall provide exterior stormwater conveyance including exterior gutters, downspouts, and leaders to below grade, and tie-in to stormwater conveyance system including all required accessories including but not limited to cleanouts, boots, etc.

1.08 MATERIAL HANDLING AND STORAGE

A. Delivery and Receiving of Materials: Each Work Scope shall provide labor and equipment necessary to receive materials, unload, inspect, sort, and distribute materials to individual work areas. Store materials in an organized manner as not to obstruct other trades and the normal day-to-day operation of this project.

1. Coordinate storage areas with the Construction Manager.
2. Schedule deliveries to minimize onsite storage and coordinate with all trades.
3. Provide flagmen for operation in contact with public traffic for deliveries.

B. Hoisting: Provide hoisting equipment, labor, means and operations to complete your Work Scope.
C. Scaffolding: Each Work Scope is responsible for your own working platforms, scaffolding, and equipment necessary to access Work. Coordinate scope and timing with all trades.
D. Protection of Adjacent Work: Each Work Scope shall provide necessary protection of roof and adjacent surfaces during the production of this work.

1. Interior scaffolding and carts must be utilized with rubber, locking wheels.

1.09 WORK RESTRICTIONS

A. Contractor’s Field Offices: As directed by the Construction Manager and Owner and outlined in Section 01 50 00, Temporary Facilities and Controls.
B. Construction Staging Area: As directed by the Construction Manager and Owner.
C. Construction Parking: As directed by the Construction Manager and Owner.
D. Egress and Access Routes: Do not obstruct existing access and egress from adjacent Site areas or portions of existing facilities which remain operational throughout Construction Period.

1. Move stored products that interfere with operations of Owner.
2. Obtain and pay for use of additional storage or work areas needed for operations.
3. Keep a path for emergency services to access remaining operational facilities and the site.

4. Do not store materials on existing roof areas.

E. Limit activities to Construction Limits: Notify the Construction Manager if Work activities require work outside Construction Limits. Contactor will coordinate activities with the Construction Manager.

F. Work in Occupied Areas: Work in occupied areas of the facility must be coordinated with the Construction Manager and Owner.

G. Hot Work Permits: Work activities using and causing sparks and open flame must be coordinated with the Construction Manager and the Owner and special procedures shall be complied with as directed by the Construction Manager and Owner.

H. Working Hours: Conduct Work during normal working hours unless expressly agreed to by the Construction Manager and their Representative.

Construction Times (Subject to Revision): It is understood that the project construction schedule will meet the following Owner schedules (i.e. work can proceed during the following periods with prior approval by the District). Work may not negatively affect occupied spaces during school hours. Saturday work schedules are permitted with prior scheduling and approval with possible extra charges from the Owner. Sunday and Holiday times must be scheduled with the Owner by permission and will involve overtime charges for the Owner staff.

Summer Schedule, mid-June through mid-August
Weekdays: Monday – Friday 7:00 a.m. – 7:00 p.m.

Project work hours permitted during School Year for work with outdoor access
Weekdays Monday – Friday 7:00 a.m. – 7:00 p.m.

Material Deliveries are permitted only during project work hours unless coordinated with and approved by the Construction Manager.

I. System shutdowns will be permitted during non-student periods only, and only with Owner approval and favorable weather conditions pertinent to the system.

J. Tobacco Free Site: Project Site is a “tobacco free” zone; there is absolutely no smoking, vaping, or use of tobacco products of any kind. Tobacco products are prohibited on the Owner’s Property as required by State Law.

K. Noise Restrictions: Maintain a level of conduct and decorum consistent with the environment in which the Work is being performed.

END OF SECTION 01 12 00

SECTION 01 22 00 – UNIT PRICES AND MATERIAL ALLOWANCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for unit prices and allowances.

1. In the space indicated on the Bid Form, submit unit prices as required by this section and listed in the Unit Price Schedule. Only one value for each unit price will be allowed.
2. A unit price is a price per unit of measurement for materials or services that will be added to or deducted from the Contract Sum by Change Order in the event the quantities of Work required by the Contract Documents are increased, decreased, or exceeds the allowance.
3. Unit prices include all but not limited to necessary delivery, materials, labor, overhead, profit, insurance and applicable taxes.
4. Refer to individual Specification Sections for construction activities requiring the establishment of unit prices.

B. While unit prices are not to be used in the selection of the successful Bidder, they must be submitted and approved prior to execution of the Contract.

1. The Owner reserves the right to reject a unit price they deem unsatisfactory and to require a resubmittal.
2. The Owner reserves the right to reject the Contractor's measurement of quantities, and to have this Work measured by an independent surveyor or third party before accepting contract amount.

C. The Owner reserves the right to reject any bid that does not include a unit price or assign a unit price based on other bidders' unit prices.

D. Prior to utilizing any allowances, the Contractor will review the proposed utilization with the Construction Manager. If the utilization is approved of in writing, then the Contractor must coordinate all work for which it plans to utilize the allowance with the Construction Manager to ensure that the Construction Manager can observe and confirm the quantities utilized. Allowances include cost of all labor, equipment, material, receiving, handling, and installation as well as Contractor overhead and profit.

E. Certain materials and equipment including installation are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order. Allowances are considered part of the base bid contract and are in addition to amounts otherwise specified or stated in the Contract Documents or that are otherwise reasonably necessary to complete the Work.

F. Upon Substantial Completion, or earlier if it becomes clear than an allowance will not be utilized, the Contractor will execute a Change Order reducing the Contract Sum by the unused quantity allowance, multiplied by the applicable Unit Price.

G. NO CASH allowances for any purpose are included in the Project.

PART 2 - PRODUCTS – (Not Applicable).

PART 3 - EXECUTION – SCHEDULE OF QUANTITY / MATERIAL ALLOWANCES

3.01 WORK SCOPE 1: GENERAL CONTRACTOR – SCHEDULE OF UNIT PRICES AND CORRESPONDING QUANTITY ALLOWANCES

A. Unit Price No. WS-1A: Rock Removal

1. Description: Provide Unit Price per CY to remove rock as defined by the Contract Specifications, geotechnical report, and verified by the 3rd party inspector at locations directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Cubic Yard**
3. Quantity Allowances: **One Hundred (100) CY**

B. Unit Price No. WS-1B: Import Structural Fill

1. Description: Provide Unit Price per CY to import structural fill 2A stone, including spreading and compacting to 98% of its maximum dry density as established by ASTM D 698 in 8” lifts at locations directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Cubic Yard**
3. Quantity Allowances: **Five Hundred (500) CY**

C. Unit Price No. WS-1C: Acoustical Ceiling Tile

1. Description: Provide Unit Price per SF to install ceiling grid and acoustical ceiling tile at locations directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Square Foot**
3. Quantity Allowances: **Two Hundred (200) SF**

D. Unit Price No. WS-1D: VCT

1. Description: Provide Unit Price per SF to install VCT at locations directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Square Foot**
3. Quantity Allowances: **Two Hundred (200) SF**

E. Unit Price No. WS-1E: Painter Hours

1. Description: Provide a fully burdened painter for the Owner's use for work as directed by the Construction Manager and at his discretion
2. Unit of Measurement: **Per Hour**
3. Quantity Allowances: **Forty (40) Hours**

F. Unit Price No. WS-1F: General Laborer Hours

1. Description: Provide a fully burdened general laborer for the Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per Hour**
3. Quantity Allowances: **Forty (40) Hours**

G. Unit Price No. WS-1G: Carpenter Hours

1. Description: Provide a fully burdened carpenter for the Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per Hour**
3. Quantity Allowances: **Not Applicable**

H. Unit Price No. WS-1H: Mason Hours

1. Description: Provide a fully burdened mason for the Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per Hour**
3. Quantity Allowances: **Not Applicable**

I. Unit Price No. WS-1I: Furnish and Install Structural Steel

1. Description: Provide a Unit Price per Ton to furnish and install structural steel as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per Ton**
3. Quantity Allowances: **Not Applicable**

J. Unit Price No. WS-1J: Excavate & Export Unsuitable Soils and Replace with 2A Modified

1. Description: Provide Unit Price per CY to excavate, export, and replace unsuitable soils with 2A modified fill as directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Cubic Yard**
3. Quantity Allowances: **Not Applicable**

3.02 WORK SCOPE 2: ELECTRICAL – SCHEDULE OF UNIT PRICES AND CORRESPONDING QUANTITY ALLOWANCES

A. Unit Price No. WS-2A: Rock Removal

1. Description: Provide Unit Price per CY to remove rock as defined by the Contract Specifications, geotechnical report, and verified by the 3rd party inspector at locations directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Cubic Yard**
3. Quantity Allowances: **One Hundred (100) CY**

B. Unit Price No. WS-2B: Duplex Receptacle & Wiring

1. Description: Provide additional duplex receptacle and 20A circuit, including 20A/1P circuit breaker, backbox, faceplate, and 100’ one-way circuit distance.
2. Unit of Measurement: **Per Each**
3. Quantity Allowances: **Not Applicable**

C. Unit Price No. WS-2C: Data Outlets

1. Description: Provide additional computer data outlet in masonry or stud wall that includes up to 100' of armored plenum cable and all termination and accessories as specified in the project drawings and specifications.
2. Unit of Measurement: **Per Each**
3. Quantity Allowances: **Six Locations (6)**

D. Unit Price No. WS-2D: Telephone Outlets

1. Description: Provide additional telephone outlet in masonry or stud wall that includes up to 100’ of armored plenum cable and all termination and accessories. Perform in accordance with applicable Division 26 Sections and Drawing requirements for similar work.
2. Unit of Measurement: **Per Each**
3. Quantity Allowances: **Not Applicable**

E. Unit Price No. WS-2E: Exit Device and Wiring

1. Description: Provide additional exit sign type ‘X’ including mounting equipment, up to 100’ of wiring with appropriate terminations and connections. Perform in accordance with applicable Specifications and Drawing requirements for similar work.
2. Unit of Measurement: **Per Each**
3. Quantity Allowances: **Not Applicable**

F. Unit Price No. WS-2F: Fire Alarm Smoke Detector Device and Wiring

1. Description: Provide additional mounted fire alarm smoke detector device assembly that includes backbox, cabling, conduit, terminations, connections to fire alarm system, required programming, and 100’ of wiring. Perform in accordance with applicable Specifications and Drawing requirements for similar work.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Not Applicable**

G. Unit Price No. WS-2G: Fire Alarm Audio/Visual Device and Wiring

1. Description: Provide additional mounted audio/visual fire alarm device assembly that includes backbox, cabling, conduit, terminations, connections to fire alarm system, required programming, and 100’ of wiring. Perform in accordance with applicable Specifications and Drawing requirements for similar work.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Not Applicable**

H. Unit Price No. WS-2H: Fire Alarm Pull Station Device and Wiring

1. Description: Provide additional mounted fire alarm pull station device assembly that includes backbox, cabling, conduit, terminations, connections to fire alarm system, required programming, and 100’ of wiring. Perform in accordance with applicable Specifications and Drawing requirements for similar work.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Not Applicable**

I. Unit Price No. WS-2I: Card Reader Cabling

1. Description: Provide a Unit Price per assembly to furnish and install an additional Card Reader cabling, up to 100' of wiring with appropriate terminations, connections, and programming. Perform in accordance with applicable Specifications and Drawing requirements for similar work.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Two Locations (2)**

J. Unit Price No. WS-2J: Wireless Access Point Cabling

1. Description: Provide a Unit Price per assembly to furnish and install an additional wireless access point cabling. Install 300’ of wireless access point cabling plus two data drops per access point in accordance with the applicable Division 27 Sections and Drawing requirements for similar work.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Four Locations (4)**

K. Unit Price No. WS-2K: Video Surveillance Camera Location

1. Description: Provide a Unit Price per assembly to furnish and install an additional video surveillance camera location consisting of backbox/junction box, (2) data drops, and 200' of cabling, conduit and all terminations per drop and connections and programming to the video surveillance system. Perform in accordance with applicable Division 27 Sections and Drawing requirements for similar work.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Four Locations (4)**

L. Unit Price No. WS-2L: Journeyman Electrician Labor

1. Description: Provide a fully burdened journeyman electrician labor for Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per Man-hour**
3. Quantity Allowances: **Include Forty (40) Hours**

3.03 WORK SCOPE 3: MECHANICAL – SCHEDULE OF UNIT PRICES AND CORRESPONDING QUANTITY ALLOWANCES

A. Unit Price No. WS-3A: Additional Ductwork

1. Description: Provide insulated galvanized steel ductwork including hangers and accessories in accordance with the applicable Division 23 sections.
2. Unit of Measurement: **Per Pound**
3. Quantity Allowances: **Five Hundred (500) LBS**

B. Unit Price No. WS-3B: Additional temperature/humidity device, include mounting of device, up to 100' of wiring with appropriate terminations, connections, and programming

1. Description: Provide Unit Price per Assembly to furnish and install an additional temperature/humidity device, include mounting of device, up to 100' of wiring with appropriate terminations, connections, and programming.
2. Unit of Measurement: **Per Assembly**
3. Quantity Allowances: **Not Applicable**

C. Unit Price No. WS-3C: Journeyman Pipefitter Labor

1. Description: Provide Unit Price per Hour for a fully burdened journeyman pipefitter worker for Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per man-hour**
3. Quantity Allowances: **Include 40 man hours**

D. Unit Price No. WS-3D: Journeyman Sheetmetal Labor

1. Description: Provide Unit Price per Hour for a fully burdened journeyman Sheetmetal worker for Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per man-hour**
3. Quantity Allowances: **Include 40 man hours**

3.04 WORK SCOPE 4: PLUMBING – SCHEDULE OF UNIT PRICES AND CORRESPONDING QUANTITY ALLOWANCES

A. Unit Price No. WS-4A: Rock Removal

1. Description: Provide Unit Price per CY to remove rock as defined by the Contract Specifications, geotechnical report, and verified by the 3rd party inspector at locations directed by Construction Manager or Architect.
2. Unit of Measurement: **Per Cubic Yard**
3. Quantity Allowances: **Fifty (50) CY**

B. Unit Price No. WS-4B: Additional 1" Domestic Water Piping

1. Description: Provide 3/4" insulated domestic water piping, hangers, accessories and fittings in accordance with the applicable Division 22 sections.
2. Unit of Measurement: **Per Lineal Foot**
3. Quantity Allowances: **One Hundred (100) LF**

C. Unit Price No. WS-4C: Additional 1-1/2" Domestic Water Piping

1. Description: Provide 1" insulated domestic water piping, hangers, accessories and fittings in accordance with the applicable Division 22 sections.
2. Unit of Measurement: **Per Lineal Foot**
3. Quantity Allowances: **One Hundred (100) LF**

D. Unit Price No. WS-4D: Additional Below Grade 4" PVC Sanitary Piping

1. Description: Provide a Unit Price per Linear Foot to furnish and install additional below grade sanitary piping as detailed in Specifications and Drawings including excavation, connections, bedding, backfill, and compaction.
2. Unit of Measurement: **Per Linear Foot**
3. Quantity Allowances: **One Hundred (100) LF**

E. Unit Price No. WS-4E: Additional 1" Ball Valve

1. Description: Provide a Unit Price per Assembly to furnish and install 1" ball valve in 1" domestic water piping in accordance with the applicable Division 22 sections.
2. Unit of Measurement: **Per assembly**
3. Quantity Allowances: **Not Applicable**

F. Unit Price No. WS-4F: Additional 3/4" Ball Valve

1. Description: Provide a Unit Price per Assembly to furnish and install 3/4" ball valve in 3/4" domestic water piping in accordance with the applicable Division 22 sections.
2. Unit of Measurement: **Per assembly**
3. Quantity Allowances: **Not Applicable**

G. Unit Price No. WS-4G: Journeyman Plumber Labor

1. Description: Provide a fully burdened journeyman Plumber for Owner's use for work as directed by the Construction Manager and at his discretion.
2. Unit of Measurement: **Per Man hour**
3. Quantity Allowances: **Include Forty (40) Hours**

END OF SECTION 01 22 00

SECTION 01 23 00 – ALTERNATES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section describes the limits of the requested alternates to the Contract work. Refer to the Product/Execution Articles of the appropriate Specifications and the Drawings for information pertaining to the work of each alternate.
B. Each proposal under an alternate shall include all incidental work and all adjustments necessary to accommodate the changes. All work shall meet the requirements of the Drawings, Specifications and appropriate details.
C. Submit each alternate proposal as an individual cost for the particular alternate. The alternate shall be proposed under the premise that no other alternates have been accepted. Should the work of an alternate called for by the Bid Form not affect the cost of the work, state "No Change" in the space provided. If an alternate is left blank, the Owner reserves the right to throw out the entire bid or interpret the alternate as "No Change".
D. Include taxes which are applicable to work involved in alternates as well as costs, if any, for increased coverage of bonds and insurance.
E. Any of the alternates may be accepted by Owner and will be used in determining the low bidder.
F. Owner may, at their option, vary the scope of the work by authorizing alternates which will add to the work, deduct from the work or substitute materials, equipment or methods.
G. Each Bidder shall examine the Drawings and Specifications to determine the extent to which their work is affected by bid alternates. Include in the space provided on the bid form the cost of any added or deducted work resulting from each alternate.
H. Contractor is responsible for providing work if applicable to each alternate, whether or not an added or deducted cost is included on their bid form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 IMPLEMENTATION

A. If the Owner elects to proceed on the basis of one or more of the alternates, make all modifications to the Work required in the furnishing and installation of the selected alternate or alternates subject to the approval of the Architect at no additional cost to the Owner except as proposed in the Bid.
B. Coordinate pertinent related work and modify surrounding work as required to properly integrate the work under each alternate, and to provide the complete construction required by Contract Documents.
C. If so stated in the Agreement, or modifications thereto, provide alternate materials, equipment and/or construction as specified.
D. Execute accepted alternates under the same conditions as other Work of the Contract including project schedule, milestones, and phases required for completion of the Work.

3.02 SCHEDULE OF ALTERNATES

A. Work Scope No. 1: General Construction

1. Alternate No. 1: Unclassified Rock Excavation.
    a. Base Bid: Classified excavation. Contractor is to provide Unit Prices for excavation and include quantities of Unit Prices in the Allowance as part of the base bid. The cost for rock excavation will be paid by change order out of the Allowance.
    b. Alternate Bid: Unclassified excavation. Contractor is responsible for all excavation cost as part of the Contract. The quantities for Unit Price WS-1A are to be reduced to zero (0) and no rock removal unit price will be paid by owner. There is to be no allowance cost for rock removal in the Contract amount if this alternate is accepted.

2. Alternate No. 2: Use EPDM Roof Membrane in lieu of colored (red) TPO Roof Membrane
    a. Base Bid: Provide Red TPO Membrane Roof as specified in the project specifications and drawings.
    b. Alternate Bid: Furnish and install EPDM Roofing in lieu of TPO.

3. Alternate No. 3: Replace brick accent areas with ground face block.
    a. Base Bid: Furnish and install brick as indicated in the project specifications and drawings.
    b. Alternate Bid: Eliminate the procurement and installation of the brick, replacing the locations specified with ground face block including joints and finishing.

4. Alternate No. 4: Eliminate all work associated with the Pole Barn.
    a. Base Bid: Provide new metal siding and roofing on the Pole Barn.
    b. Alternate Bid: Eliminate all work associated with the Pole Barn.

5. Alternate No. 5: Eliminate all work associated with the Visitor's Side Concession Building.
    a. Base Bid: Construct the Visitor's Side Concession building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Visitor's Side Concession Building. Reference floor plans for modifications to surrounding elements.

6. Alternate No. 6: Eliminate all work associated with the Trainer's Room Building.
    a. Base Bid: Construct the Trainer's Room Building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Trainer's Room Building. Reference exterior elevations for modifications to surrounding elements.

B. Work Scope No. 2: Electrical Construction

1. Alternate No. 1: ADD – Unclassified Rock Excavation.
    a. Base Bid: Classified excavation. Contractor is to provide Unit Prices for excavation and include quantities of Unit Prices in the Allowance as part of the base bid. The cost for rock excavation will be paid by change order out of the Allowance.
    b. Alternate Bid: Unclassified excavation. Contractor is responsible for all excavation cost as part of the Contract. The quantities for Unit Price WS-2A are to be reduced to zero (0) and no rock removal unit price will be paid by owner. There is to be no allowance cost for rock removal in the Contract amount if this alternate is accepted.

2. Alternate No. 2: Eliminate all work associated with the Visitor's Side Concession Building.
    a. Base Bid: Construct the Visitor's Side Concession building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Visitor's Side Concession Building. Reference floor plans for modifications to surrounding elements.

3. Alternate No.3: Eliminate all work associated with the Trainer's Room Building.
    a. Base Bid: Construct the Trainer's Room Building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Trainer's Room Building. Reference exterior elevations for modifications to surrounding elements.

C. Work Scope No. 3: Mechanical Construction

1. Alternate No. 1: Eliminate all work associated with the Visitor's Side Concession Building.
    a. Base Bid: Construct the Visitor's Side Concession building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Visitor's Side Concession Building. Reference floor plans for modifications to surrounding elements.

2. Alternate No. 2: Eliminate all work associated with the Trainer's Room Building.
    a. Base Bid: Construct the Trainer's Room Building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Trainer's Room Building. Reference exterior elevations for modifications to surrounding elements.

D. Work Scope No. 4: Plumbing Construction

1. Alternate No. 1: ADD – Unclassified Rock Excavation.
    a. Base Bid: Classified excavation. Contractor is to provide Unit Prices for excavation and include quantities of Unit Prices in the Allowance as part of the base bid. The cost for rock excavation will be paid by change order out of the Allowance.
    b. Alternate Bid: Unclassified excavation. Contractor is responsible for all excavation cost as part of the Contract. The quantities for Unit Price WS-4A are to be reduced to zero (0) and no rock removal unit price will be paid by owner. There is to be no allowance cost for rock removal in the Contract amount if this alternate is accepted.

2. Alternate No. 2: Eliminate all work associated with the Visitor's Side Concession Building.
    a. Base Bid: Construct the Visitor's Side Concession building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Visitor's Side Concession Building. Reference floor plans for modifications to surrounding elements.

3. Alternate No. 3: Eliminate all work associated with the Trainer's Room Building.
    a. Base Bid: Construct the Trainer's Room Building as per the plans and specifications.
    b. Alternate Bid: Eliminate all work associated with the Trainer's Room Building. Reference exterior elevations for modifications to surrounding elements.

END OF SECTION 01 23 00

SECTION 01 26 00 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications. Changes in the Project scope of work affecting the project will be made through Procore.
B. See General Conditions of the Work for methods of determining cost or credit, mark-up and schedule for submitting claims.

1.03 MINOR CHANGES IN THE WORK

A. Construction Manager or Architect will issue Supplemental Instructions (SI) which are used to authorize minor changes in the Work not involving adjustment to Contract Sum or time.
B. This no cost change is to be carried out in accordance with the modifications to the Contract Documents described therein. If this change effects cost, do not proceed with this change. Notify the Construction Manager in writing within 10 days of receipt that an itemized (labor and material) quotation will be submitted within 21 days of initial receipt of this Supplemental Instruction. If a cost is not submitted within 21 days, this Supplemental Instruction will be accepted at no additional cost.

1.04 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Construction Manager are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
2. Within 10 days of receipt of Proposal Request, Contractor submit an itemized quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. If a cost is not submitted within 10 days, this Proposal Request can be accepted at no additional cost. Written approval is required prior to proceeding with this change.

B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

C. Proposal Request Form: For Change Order Proposals, use forms provided by the Construction Manager.

1.05 CHANGE ORDER PROCEDURES

A. The Construction Manager will review the Contractor’s labor and material itemized quotation and respond in writing whether it is acceptable, or needs revision. When all pricing is accepted by the Construction Manager and Owner, a Change Order will be processed. Change Orders will be processed at intervals determined by the Construction Manager throughout the construction schedule.

1.06 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive (CCD): The Construction Manager may issue a Construction Change Directive to instruct the Contractor to proceed with a change in the Work for subsequent inclusion in a Change Order. The CCD contains a complete description of the change in the Work and designates a method to be followed to determine change in the Contract Sum or time.

1. Proceed immediately to carry out changes as directed in the issued CCD in the Contract Documents as described therein.
1. Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
2. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment. CMTA utilizes Procore for the invoicing process.

B. Related Sections include the following:

1. Division 01 Section 01 22 00 "Unit Prices and Material Allowances" for administrative requirements governing the use of unit prices.
2. Division 01 Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Division 01 Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.03 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating the entire Contract Sum among the various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.04 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule. The Schedule of Values are to provided by the Contractor for entry into Procore.

1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with Continuation Sheets.
b. Submittals Schedule.

2. Provide the Schedule of Values information within template provided by the Construction Manager at the earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
3. Sub-schedules: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least two line items (labor and material) for each Specification Section. If invoicing for shop drawings break that amount into a separate line item. Construction Manager will enter the Schedule of Value within the “Commitments” section of Procore for use with the Project.

1. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
2. Round amounts to nearest whole dollar, total shall equal the Contract Sum.
3. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
4. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on site and items stored off site.
5. Allowances: Provide a separate line item in the Schedule of Values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
6. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
7. Temporary facilities and other major cost items that are not direct costs of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
8. Schedule of Values Updating: Update and resubmit the Schedule of Values before the next Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.
9. Project Schedule Updating: Update and resubmit the Project Milestone Schedule with each Application for Payment when approved schedule changes result in a change to the overall schedule.

1.05 APPLICATIONS FOR PAYMENT

A. Procore’s “Invoicing” tool to be utilized.

1. CM will issue an Invitation to Bill monthly.

2. Under the “Do you want to bill this period,” area, choose the following:
    a. If you want to submit the invoice, click Yes. Then click Post Response and continue with step 3. OR
    b. If you are not ready to submit the invoice, click No. Then click Post Response.

3. At the Create New Invoice page in Procore, the Period Start, Period End and Billing Date is pre-filled with what the CPM set. Enter the invoice number.
4. In the Detail section, enter either your percent complete or amount complete for each line item in your original Schedule of Values
5. Enter the materials presently stored amount. This will be added to the percent complete for each line item. Reference Stored Material requirements detailed in Article 9.3.2 of Section 00 72 00, General Conditions.
6. In the Approved Commitment Change Orders section, repeat the process for each change order’s line items by entering the percent or amount complete for each line item. Any new approved change orders will automatically be added at this location.
7. Pencil copies shall be submitted through Procore’s “Invoicing” tool for Construction Manager and/or Construction Manager review, no later than the 15th of each month forecast for work performed to the end of the month in accordance with Article 9.3.1 of Section 00 72 00, General Conditions.
8. Once pencil copies are approved, attach required backup documentation; at a minimum, a signed, notarized copy of the application. Contact the CPM to determine if additional documentation is required.
    a. How to export the Pay Application in Procore:
        1) Click Save
        2) Click Export and select PDF
        3) Sign the PDF
        4) Return to Procore and select the Summary Tab
        5) Click Edit
        6) Attach the signed PDF’s

B. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect, Construction Manager and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

C. Payment Application Times: The date for submission of each application for payment is the 25th day of each month. The period covered by each Application for Payment ends on the FINAL day of each month. All payment applications must comply with project scheduling requirements. These dates are subject to change for the duration of the Project by the Owner prior to the first application for payment. No faxed, emailed or mailed, Applications for Payment will be accepted. The period of Construction Work covered by each Application for Payment is the period indicated in the Agreement.

D. Accuracy – All Payment Applications must accurately reflect work completed through the end of the month. Any Payment Application deemed inaccurate by the Construction Manager will be rejected in its entirety.
E. Monthly payments will be made per Section 5.1 of the A132-2019. Retainage will be held in accordance with Article 9.3.4 of Section 00 72 00, General Conditions. Payment will be made for material stored on the project site, and material stored off the project site with prior agreement.
F. Payment Application Forms: Procore's preset AIA form to be utilized.
G. Application Preparation: Complete every entry in Procore. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.

H. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on site and items stored off site. Reference Article 9.3.2 of Section 00 72 00, General Conditions, for complete requirements of Stored Materials.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:
4. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
5. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
6. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of Values.
3. Contractor's Construction Schedule (preliminary if not final).
4. Products list.
5. Schedule of unit prices.
6. Submittals Schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants

9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress reports.
12. Report of pre-construction conferences.
13. Initial settlement survey and damage report if required.

J. The first payment application will not be processed unless these, and any other items required by the Construction Manager or Architect, are processed.

K. A separate Application(s) for Payment shall be submitted for when reduction in retainage is requested shall be submitted along with AIA Document G707A-1994, "Consent of Surety to Reduction or Partial Release of Retainage" and surety's executed appropriate Power of Attorney.

L. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment.

1. This Application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
2. Administrative actions and submittals that shall precede this Application include:

    a. Occupancy permits and similar approvals.
    b. Warranties (guarantees) and maintenance agreements.
    c. Test/adjust/balance records.
    d. Maintenance instructions.
    e. Meter readings.
    f. Startup performance reports.
    g. Changeover information related to Owner's occupancy, use, operation and maintenance.
    h. Final clean
    i. Application for reduction of retainage and consent of surety to reduction of retainage.
    j. List of incomplete Work, recognized as exceptions to Construction Manager's Certificate of Substantial Completion.
    k. Provide Operation and Maintenance (O+M) materials or supplies listed in all pertaining Specification Sections.

M. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted. Administrative actions and submittals that must precede the final Application for Payment include the following:

1. Evidence of completion of Project closeout requirement.
2. Certification of completion of final punch list items.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707-1994, "Consent of Surety to Final Payment."
7. Completion of items specified for completion after Substantial Completion
8. Evidence that claims have been settled.
9. Ensure that incomplete Work will be completed without undue delay.

10. Transmittal of required Project construction records to the Construction Manager, including As-Builts, warranty, O+M's.
11. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
12. Removal of temporary facilities and services.
13. Removal of surplus materials, rubbish, and similar elements.
14. Final, liquidated damages settlement statement.
15. Any other waivers and releases as required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Submittals.
3. Administrative and supervisory personnel.
4. Project meetings.
5. Web Based Project Management System (Procore)

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Sections: The following Sections contain requirements that relate to this Section:

1. Section 01 12 00 "Multiple Work Scope Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
2. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
3. Division 01 Section 01 31 17, “Coordination Drawings” for procedures and requirements of the coordination of installation of products and materials provided by separate primes.
4. Division 01 Section 01 73 00 "Execution" for procedures for coordinating general installation and field engineering services.
5. Division 01 Section 01 77 00 "Closeout Procedures" for coordinating Contract closeout.

1.03 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in various Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. If necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Pre-installation conferences.
7. Project closeout activities.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work.

E. Each Contractor shall:

1. Perform his Work as mandated by the project schedule to maintain the required sequence and the overall progress of the project.
2. Coordinate Work of his own employees and subcontractors.
3. Expedite his Work to assure compliance with approved schedules.
4. Coordinate his Work with that of other Prime Contractors and work by the Owner.

F. Modifications to the Work made necessary by a Contractor’s failure to properly coordinate the Work, shall be made by that Contractor, at no cost to the Owner.

G. Remove Work installed out of sequence that prohibits a separate Prime Contractor the ability to install Work that is dependent on their prior installation of materials or equipment. No additional compensation or time extension will be considered for the uncovering or removal of the out of sequence Work.

H. Each Prime Contractor shall coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on the Contract Drawings. Follow routing shown for pipes, ducts and conduit as closely as practicable; place runs

parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance and for repairs.

I. Where availability of space is limited, the Construction Manager and each Prime Contractor shall coordinate installation of different components with other Prime Contractors to assure maximum accessibility for required maintenance, service and repair and to meet governing code requirements.

J. Each Prime Contractor shall make adequate provisions to accommodate items scheduled for later installation.

K. Each Prime Contractor shall, in finished areas except as otherwise indicated, conceal pipes, ducts and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements provided by other Contractors.

L. Each Prime Contractor shall verify utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

M. Each Prime Contractor shall coordinate Testing and Inspection Services:

1. Verify required laboratory personnel are present.
2. Verify tests are made in accord with specified standards.
3. Review test reports for compliance with specified standards.
4. Recommend and administer any required retesting.
5. Submit copies to the Owner, Architect/Engineer, and Construction Manager.
6. Coordinate with Owner’s Geotechnical Engineer for compaction and moisture content testing. Notify Geotechnical Engineer in advance of need for testing in accord with Project Construction Schedule.
7. Coordinate with Owner’s Inspection Agency for concrete, masonry and steel testing and inspection. Notify agency in advance when testing and inspection is required.

N. Each Prime Contractor shall coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion, and for portions of Work designated for Owner’s partial occupancy.

O. Each Prime Contractor shall, after Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accord with Contract Documents, to minimize disruption of Owner’s activities.

1.04 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Indicate relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Refer to Division 23 Section "Basic Mechanical Materials and Methods" and Division 26 Section "Basic Electrical Materials and Methods" for specific Coordination Drawing requirements for mechanical and electrical installations.

B. Staff Names: Submit a list of principal staff assignments, including superintendent and other personnel in attendance at Project site in accordance with procedures outlined in Section 3.9 of Section 00 72 00, General Conditions.

1.05 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1. Include special personnel required for coordination of operations with other contractors.

1.06 PROJECT MEETINGS

A. Preconstruction Conference: The Construction Manager will schedule a preconstruction conference before starting construction, at a time convenient to Owner, Architect and Contractor(s) within 15 days after execution of the Agreement. The conference will be held at Project site or another convenient location. The meeting will review responsibilities and personnel assignments and other pertinent issues to the project.

1. Attendees: Authorized representatives of Owner, Architect and their consultants; Prime Contractor(s) and their superintendent; major subcontractors and other Owner pre-approved parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

a. Tentative construction schedule.
b. Phasing.
c. Critical work sequencing.
d. Designation of responsible personnel.
e. Procedures for processing field decisions and Change Orders.
f. Procedures for processing Applications for Payment.
g. Distribution of the Contract Documents.
h. Submittal procedures.
i. Preparation of Record Documents.
j. Use of the premises.
k. Responsibility for temporary facilities and controls.
l. Parking availability.
m. Office, work, and storage areas.
n. Equipment deliveries and priorities.
o. First aid.
p. Security.
q. Progress cleaning.
r. Working hours.
s. Construction IAQ Management Plan activities.

B. Pre-installation Conferences: Prime Contractors and Construction Manager shall coordinate and conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Construction Manager, installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the Architect and Owner of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related Change Orders.
    d. Purchases.
    e. Deliveries.
    f. Submittals.
    g. Review of mockups.
    h. Possible conflicts.
    i. Compatibility problems.
    j. Time schedules.
    k. Weather limitations.
    l. Manufacturer's written recommendations.
    m. Warranty requirements.
    n. Compatibility of materials.
    o. Acceptability of substrates.
    p. Temporary facilities and controls.
    q. Space and access limitations.
    r. Regulations of authorities having jurisdiction.
    s. Testing and inspecting requirements.
    t. Coordination with other work.
    u. Required performance results.
    v. Protection of construction and personnel.

3. Construction Manager to record significant conference discussions, agreements, and disagreements and issue meeting minutes to the group.
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

C. Progress Meetings: Attend progress meetings as scheduled or when notified. Meetings will be generally held every other week unless progress or significant issues arise in the progress or lack thereof of the work.

1. Attendees: In addition to representatives of Owner, Architect and CM, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Resolution of drawing conflicts.
        4) Status of submittals.
        5) Deliveries.
        6) Off-site fabrication.
        7) Access.
        8) Site utilization.
        9) Temporary facilities and controls.
        10) Work hours.
        11) Hazards and risks.
        12) Review of open RFI’s.
        13) Progress cleaning.
        14) Quality and work standards.
        15) Change Orders.
        16) Documentation of information for payment requests.
        17) Site security and safety issues.

3. Reporting: The Construction Manager will distribute minutes of the meeting to each party present and to parties who should have been present. Minutes will include a brief summary, in narrative form, of progress since the previous meeting and report.

    a. The Contractor shall revise the Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting. Contractor shall provide and include a two- week look ahead schedule.

D. Weekly Superintendent Meetings: Attend weekly superintendent meetings scheduled and chaired by the Construction Manager or General Contractor. Chair to be agreed upon by the Construction Manager..

1. Attendees: In addition to representatives of the Owner and Construction Manager, each contractor and subcontractor responsible for work in the upcoming two weeks to be represented.
2. Agenda: Review the work planned in the next four weeks and other items that may affect work in the short term including:

a. Deliveries.
b. Site traffic patterns.
c. Subcontractors working at the site.
d. Maintenance of erosion and sediment control features.
e. Site cleanliness.
f. Planned work hours.
g. Coordination items.

3. At each coordination meeting, the following shall occur:

a. GC shall provide a four-week look ahead schedule from the current overall CPM schedule listing the tasks start, finish, and total float for the next two weeks.
b. Each prime contractor superintendent shall be prepared to address the four-week list of tasks and provide their plan for executing each task as per the schedule.
c. If any task is not going to be met, contractors shall then provide immediate recovery plan which will be incorporated into the overall schedule update.

4. At each coordination meeting, each Prime Contractor is to provide a written four-week look ahead schedule to the General Contractor and Construction Manager for review and comment.
5. The Construction Manager shall write meeting minutes for each coordination meeting and distribute them to each Prime Contractor and to the Architect for review within two days after the meeting.

1.07 WEB BASED PROJECT MANAGEMENT SYSTEM

A. The web-based Project Management System designated for use with this Project is Procore.
B. Prime Contractors shall use the Procore system to transmit documents, track, and otherwise manage this project. Use of the system will be mandatory by the Prime Contractors to send, retrieve, and respond to data.
C. Use of this project management software will not change any contractual responsibilities of the construction team members.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 31 17 - COORDINATION DRAWINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section and each Division 01 Section applies to all separate Prime Contracts.
B. This Section includes requirements for preparation of Coordination Drawings for structural, mechanical, and electrical work.
C. Related Documents and Sections: The following documents and Sections contain requirements that relate to this Section:

1. Division 01 Section 01 33 00 “Submittal Procedures”.
2. Division 01 Section 01 31 00 “Project Management and Coordination” and Division 01 Section 01 12 00 “Multiple Work Scope Summary” specify requirements for coordinating construction operations by the Prime Contractors.

1.03 DEFINITIONS

A. Coordination Drawings: Scaled drawings prepared by each Prime Contractor which superimpose work of several trades, intended for careful coordination of installation of products and materials provided by separate entities.
B. Key Drawings: Two-dimensional drawings of each floor or area of the Project indicating proposed subdivision into ductwork layout shop drawings.
C. Electronic Documents: Electronic Reproductions and Photocopy Reproductions of Contract Drawings will not be accepted for Shop Drawing and Product Submittals by contractors. Refer to procedures for obtaining contract drawings for background use only. The Construction Documents or any distributed BIM Models shall not be construed as dictating the ways and means of construction.

1.04 COORDINATION DIGITAL DATA FILES

A. Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings operating in Microsoft Windows operating system.
2. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format and CAD .dwg.

3. Architect and their consultants will furnish Contractor one set of Drawings for use in preparing coordination digital data files.

    a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
    b. Contractor shall execute a data licensing agreement in the form of Agreement included in this Project Manual.
    c. Contractor shall execute Specification Section 01 31 26, Electronic Communication Protocols, and additional releases that may be provided by the Architect prior to the transfer of files to the Contractor.

1.05 COORDINATION DRAWING PROCEDURES

A. General: Approval of Shop Drawings assumes satisfactory incorporation of coordination information.
B. Do not use Contract Drawings as Coordination Drawings.
C. Initial Submittal: Key Drawings shall be submitted by HVAC Contractor within 60 calendar days of Contract Award.
D. Final Submittal: Submit final Coordination Drawings 60 days after submission of Initial Submittal unless otherwise required by the Construction Schedule.
E. Provide Coordination Drawing initial submittals as follows:

1. Key Drawings: The HVAC Contractor shall prepare and submit Key Drawings consisting of scaled drawings in .dwg format of each floor or area of the Project indicating proposed subdivision into ductwork layout shop drawings, with applicable shop drawing numbers.
2. Review: The HVAC contractor shall conduct a Coordination Planning Meeting with all contractors and the Construction Manager to review the Key Drawings and determine adequacy of proposed layouts to cover the Project and the following:

    a. Sequencing and scheduling of Coordination Drawing production in relation to the Construction Schedule.
    b. Complex areas for which larger scale drawings and details will be required.
    c. Coordination Drawing format, text, title blocks, and Contractor coordination sign-off.

3. Layout Drawings: Upon acceptance of Key Drawings, HVAC Contractor shall prepare common layout drawings of all architectural and structural backgrounds to be used by all Prime Contractors for development of Coordination Drawings. Include the following elements and information on Layout Drawings:

    a. Columns and beams.
    b. Ceiling heights.
    c. Ceiling dimensional layouts as shown on reflected ceiling plans.
    d. Acoustical ceiling grid.
    e. Wall-to-wall dimensions.
    f. Partition layouts.
    g. Windows, doors, and other openings.
    h. Other major architectural and structural features shown on General Construction Drawings.

i. Indicate dimensions from column centerlines.
j. Include space in title block for Contractor sign-off and shop drawing control number.

4. Drawing Format: Produce Layout Drawings in CAD format. The version of CAD software used to produce the layout drawings shall be at the discretion of the HVAC Contractor; however, any version used must be compatible with AutoCAD 2018 or later. The HVAC Contractor shall coordinate the CAD software he proposes to use with the other Prime Contractors. The HVAC Contractor shall distribute the layout drawings in CAD format, to the following for their use:

a. Architect.
b. Construction Manager.
c. General Contractor.
d. HVAC Contractor.
e. Plumbing Contractor/Fire Protection.
f. Electrical Contractor.
g. Subcontractors as deemed appropriate by the Construction Manager or Architect.

F. Coordination Drawing Preparation: Upon receipt of CAD Layout files, each Prime Contractor shall proceed immediately and independently to indicate the work included in their Contract. Within the existing structure, each contractor shall locate and document on the coordination drawings existing pipes, conduits, ducts, lights, wires, busways, and any other components related to their contract responsibilities that are within the areas of proposed new MEP systems.

1. Circle, highlight, or otherwise clearly indicate deviations from Contract Documents and state reasons for deviation.
2. Drawing Standards: Comply with the following:

a. Indicate pipes, conduits, and pipes with diameter of less than 6 inches with single lines.
b. Indicate ducts and pipes with diameter of 6 inches and greater with double lines showing width to scale.
c. Indicate busways to scale.
d. Use competent CAD operator to develop Coordination Drawings in a clear, legible manner.
e. The Owner, Construction Manager, and Architect shall have sole judgment as to acceptability of Coordination Drawings and adherence to expected standards.

3. Ductwork Drawings: Show all items included as part of ductwork system, including:

a. Ductwork with insulation.
b. Hangers.
c. Equipment.
d. Grilles, registers, and diffusers.
e. Filters.
f. Volume dampers.
g. Fire dampers.

h. Automatic control dampers.
i. Duct smoke detectors.
j. Access doors and other access requirements for maintenance.
k. Location of ATC sensors and controllers.

4. Piping Drawings: Show all items included in piping systems, including:

a. Piping runs with insulation.
b. Hangers.
c. Valves.
d. Coils.
e. Equipment.
f. Sensors.
g. Flow monitors.
h. Access door locations and other access requirements for maintenance.

5. Plumbing and Fire Suppression Drawings: Show all items included for plumbing and fire suppression systems, including:

a. All domestic water, fire suppression, rainwater, and sanitary piping including main and branch lines.
b. Standpipes.
c. Sprinkler heads.
d. Valves.
e. Fire hose cabinets.
f. Inspector test assemblies.
g. Drain outlets.
h. Access door locations and other access requirements for maintenance.
i. Flow and tamper valves.

6. Electrical Drawings: Show items included in lighting and electrical power systems, including:

a. Equipment.
b. Panels.
c. Boxes.
d. Conduit runs.
e. Light fixture locations and depths.
f. Devices.
g. Access door locations and other access requirements for maintenance.
h. Cable trays.

7. Structural Drawings – Show all foundation and structural systems, braces, hangars, and connections.
8. Other contractors required to participate in coordination drawing program shall indicate their work on Layout Drawings as directed.
9. Additional Drawings: Each contractor shall prepare additional CAD drawings as necessary to adequately and completely show the intended routing and layout of their work. Additional drawings may include riser diagrams, flow sheets, elevations, details, sections, isometric layouts, etc. as determined by the Construction Manager or HVAC Contractor.

10. Scheduling: Time allotted for each contractor to develop their Coordination Drawings and schedule of coordination meeting will be determined by the HVAC Contractor and Construction Manager during the initial coordination planning meeting.
    a. Each Contractor's initial planning shall include preparing and coordinating not less than four (4) drawing areas per week or a greater amount if required. Project management time required to accomplish this schedule shall be included in Bid.
    b. Each Prime Contractor shall be responsible to provide sufficient staff at appropriate times to avoid delays in the coordination process.
    c. Coordination Drawing preparation shall commence as soon feasible after Contract award.

11. Interim Submissions: Coordination Drawings shall be developed and submitted in the sequence directed, in sufficient time to avoid delay in the construction schedule. Partially completed Coordination Drawing submissions may be accepted in cases where complete data is not available, pending receipt of shop drawings. Leave sufficient space to incorporate missing information in subsequent submission; note such omissions and state reason for vacant area.
    a. When final information is available, promptly insert in Coordination Drawings. Submit complete set of Coordination Drawings covering all area once final information incorporated.

G. Coordination Process: Due to the complexity of the Project, coordination activities are anticipated to be a continuous daily operation. HVAC contractor and other prime contractors shall devote whatever is necessary to fulfill the requirements and to keep the process on schedule. HVAC contractor shall revise the CAD model as necessary to reflect the coordination changes. HVAC contractors shall pay for the cost of revisions to the CAD model.

1. Basis for Placement of Elements: Make every reasonable effort to retain the layouts, placements, and routings shown on the Contract Drawings. Deviations from Contract Drawings will be permitted only when no other resolution is deemed appropriate, and only upon written approval of the Construction Manager and Architect.
2. Coordination Drawing Development: As Coordination Drawings are developed, each Prime Contractor shall check and adjust locations to avoid interferences. Highlight conflicts, particularly involving finish products, for discussion at coordination meeting. Minor variances from Contract Drawings in routing of ducts, pipes and conduits may be made to avoid conflicts when mutually agreed, provided these variances do not alter the intended function, or require an adjustment of the contract price.
    a. Do not change sizes, adjust location of exposed items, or expose items not shown exposed on Contract Drawings without approval of the Construction Manager or Architect.
    b. Do not revise any wall or chase locations, ceiling heights, door swings or locations, windows or other openings, or other features affecting the function or aesthetic effect of the building.

c. Refer conflicts and interferences that cannot be satisfactorily resolved to the Architect for a determination through the use of an RFI.
d. Coordination drawings shall follow the construction phasing drawing sequence.

3. Coordination Meetings: The HVAC Contractor and Construction Manager will schedule coordination meetings, every two weeks, or as required, to review each contractor's layout drawings. All Prime Contractors, major trade contractors and subcontractors, as required by the HVAC Contractor and Construction Manager, shall be represented at the meetings to review and resolve conflicts and interferences.
4. Coordination Sequence:

a. The GC will remove the existing ceilings in the areas indicated on the Phasing drawings.
b. The GC will provide the HVAC contractor with the structural steel detailed drawing to use for coordination in the proposed addition.
c. Structural detailer to complete structural coordination files. Upon completion, in whole or by phase or area determined at the coordination meetings, the file shall be shared with the HVAC Contractor.
d. HVAC Contractor to coordinate all HVAC systems. HVAC to perform review between HVAC, electrical, plumbing, structural items, and all other major systems such as ceilings.
e. HVAC contractor to combine all .dwg drawings and perform reviews to report all interferences or conflicts. HVAC contractor to host coordination meetings as required to resolve all interferences with respective contractors.

5. Coordination Responsibility: All Prime Contractors have collective responsibility to fulfill coordination requirements. The HVAC Contractor and Construction Manager may require attendance at meetings on a daily or weekly basis, or as otherwise required, to maintain the Project schedule.

a. If it becomes necessary to relocate any element due to failure of a Prime Contractor to coordinate the Work, the responsible Contractor shall bear the cost for such relocation, including costs for additional work performed by other Prime Contractors as a result of the responsible Prime Contractor's failure to properly coordinate.
b. Responsibility for the costs for any such additional work shall be as determined by the Construction Manager. In the event an agreement as to responsibility cannot be reached, the determination by the Construction Manager shall be final and binding.

H. Final Coordination Drawings: Once all necessary information has been added to the Layout Drawings, each Prime Contractor required to produce Coordination Drawings shall sign off on each of the other Coordination Drawings to indicate agreement and recognition of the indicated routing and layouts and the correlation with adjoining or contiguous work of all contracts.

1. After sign-off, no unauthorized deviations will be permitted. If deviations are made without consent of the Construction Manager or other affected Prime Contractors,

the responsible Prime Contractor shall remove and correct the affected work at no additional cost to the Owner.

2. Final Submission: Following agreement and sign-off by all Prime Contractors, the HVAC Contractor shall submit the files of all the systems to the Architect for review as follows; one (1) electronic copy, two (2) reproducible prints and two (2) opaque prints of completed Coordination Drawings. Furnish one additional print to all other Prime Contractors and applicable subcontractors. Furnish one (1) print to the Construction Manager. The files submitted shall note any conflicts or changes required that require further input or direction of Architect.

    a. Architect will review for resolution of conflicts and will process Coordination Drawings for general conformance with ceiling and wall systems only.

I. Shop Drawing Coordination: Shop Drawings produced separately from Coordination Drawings shall be reviewed by the submitting Prime Contractor in detail to assure conformance with coordination process. Include a statement and signature on shop drawings indicating contractor's review and conformance with Coordination Drawings.

1. Architect's or Construction Manager's review of shop drawings submitted during the coordination process will be considered independent of Coordination Drawing review and need not take into consideration information included on Coordination Drawings.
2. If changes resulting from shop drawing review affect work included in Coordination Drawings, the Prime Contractor submitting the shop drawing shall correct the Coordination Drawing, coordinate with affected Prime contractors, and resubmit for approval. Perform correction and coordination without delay or additional cost to avoid impacting the construction schedule.

J. Record Coordination Drawings: Each Prime contractor shall retain record copies of final Coordination Drawings as a working reference. Any revision which may become necessary during the course of the Work shall be neatly and accurately recorded on the record copies by each Prime Contractor. Each Prime Contractor is responsible for maintaining record Coordination Drawings up to date.

1. Each Prime Contractor shall maintain one copy of record Coordination Drawings available at the site.
2. All changes in the Work of any Contract, whether or not associated with a change in cost, shall be recorded on the Coordination Drawings.
3. Coordination Drawings and any subsequent changes shall be incorporated into As-Built Drawings.

    a. Subject to approval of the Owner, Construction Manager, and Architect, final updated Coordination Drawings may be used for As-Built Drawings.
    b. As-Built Drawings shall also incorporate details of structural elements cut during construction and supplemental bracing or reinforcement.

K. Resolution of Conflicts: Where conflicts occur either on Coordination Drawings or during actual installation in the field, and they can be resolved by rerouting conflicting elements or installing risers, offsets, falls, curves, pull boxes, transitions, or other solutions, the affected Prime Contractor shall bear the expense of adjustments required, including costs for labor and material, and shall modify the Coordination Drawings to reflect the changes at no additional cost.

1.06 COORDINATION DRAWING CONTENT

A. The Prime Contractor responsible for Work in each of the following categories shall prepare or arrange for preparation of Coordination Drawings for the following systems:

1. Kitchen equipment
2. Overhead coiling doors
3. HVAC systems
4. Electrical systems
5. Plumbing systems
6. Fire protection systems including sprinklers
7. Opening and sleeves in structural slabs and structural framing
8. Ceiling systems
9. Wall systems

B. Include on Coordination Drawings the information listed below for each of the following categories of Work:

1. Food Service Equipment

   a. Locations and dimensions of food service equipment.
   b. Access panels and hatchway.
   c. Rough-in locations for mechanical and electrical services.

2. HVAC Systems:

   a. Sizes and bottom elevations of rectangular ductwork.
   b. Sizes and centerline elevations of round ductwork, piping, and conduit.
   c. Acoustical lining in ductwork.
   d. Identification of low, medium, and high-pressure ductwork.
   e. Locations of major components, including dampers, valves, diffusers, cleanouts, and electrical distribution equipment.
   f. HVAC and ATC Panels.

3. Electrical Systems: Equipment Control Panels

   a. Horizontal and vertical runs of conduit 1-1/4-inch diameter and larger.
   b. Light fixture location.
   c. Smoke detector locations.
   d. Speaker locations.
   e. Panel boards, switch boards, switch gear, transformers, busways, generator, and motor control center.
   f. System racks.
   g. Exit signs, strobe/horn, and emergency battery pack locations.

h. Pull boxes dimensional from column centerlines.
i. Cable tray pathways.

4. Plumbing and Fire Protection System:

a. Sizes and centerline elevations of sprinkler piping.
b. Sprinkler head locations with elevations reverenced to ceiling heights.
c. Locations of major valves. Test and drain ports.
d. All rainwater piping.
e. All plumbing piping including domestic water, sanitary, vent piping, and clean out locations.

5. Structural Work:

a. Openings and sleeve locations required in slabs, walls, beams, and other structural elements, including required openings not indicated on Contract Documents.
b. Slab edge locations.
c. Columns, beams, joists, hangars, connections, braces, and other structural systems.

6. Ceiling Systems:

a. Locations in ceiling of mechanical, fire protection, and electrical items, including grilles, registers, diffusers, light fixtures, smoke detectors, sprinkler heads, exit signs, speakers, and other items.
b. Conform to locations indicated on Contract Drawings to the maximum extent possible.
c. Indicate positions relative to acoustical ceiling grid where applicable.

7. Wall Systems: All walls, chases, and other components.

1.07 STRICT COMPLIANCE WITH COORDINATION REQUIREMENTS

A. Each Prime Contractor recognizes that they must cooperate and coordinate all of their work. Any Prime Contractor that does not comply with the established timelines and requirements for coordination will have their payment request withheld until the necessary work is completed. In addition, the Prime Contractor may be charged the costs for doing any coordination drawing that is part of their contract responsibility.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 31 17

SECTION 01 31 26 – ELECTRONIC COMMUNICATION PROTOCOLS

PART 1 - GENERAL

1.01 SUMMARY

A. The Architect will provide the Contractor with one (1) electronic copy of the background drawing at their request. Requested files will be provided via email to the Contractor in AutoDesk AutoCAD format.

B. The terms and conditions on the attached form "Attachment A – GKO Architects Electronic Data Transfer Receipt" Agreement Between Architect and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media apply to all Electronic Documents issued by GKO Architects or its consultants for the project. Files will be furnished in their original software format and are not available in any other format. The Architect does not guarantee software/hardware compatibility.

1. Exceptions:

a. For access to electronic documents by Civil Engineer, K&W Engineers, Contractor will need to sign an additional Agreement for Electronic File Transfer, "Attachment B - K&W Agreement for Delivery of Files on Electronic Media."

b. For access to electronic documents by Structural Engineer, MSA Engineering, LLC, the Contractor will need to sign an additional Agreement for Electronic File Transfer that can be made available upon request.

c. For access to electronic documents by other consultants on the project, the Contractor may need to sign an additional Agreement for Electronic File Transfer that can be made available upon request.

C. The documents provided were prepared by Architect or their consultants as instruments of service to the Owner for this Project. The Owner and the Architect do not endorse or warrant the documents as suitable for any other purpose. These documents are furnished without warranties or guarantees (express, implied, or statutory), for accuracy, reliability, and completeness. These files may vary from the documents used during bidding and do not include modifications issued by addenda or bulletins. If there are conflicts between the electronic drawings and the bid set, the bid set shall govern.

D. Electronic Document Availability

1. Pre Bid: AutoCAD backgrounds pertaining only to Survey and/or proposed grading will be available prior to bid. Requesting Contractors must complete "Attachment A - Agreement Between Civil Engineer and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media" at time of request.

2. After Bid: Backgrounds as requested by the awarded contractors are provided at the discretion of the Architect or Engineer. Electronic Documents are available upon completion of “Attachment A - Agreement Between Architect and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media” by the Construction Manager on project.

E. In making this request for documents in electronic format, the Contractor hereby agrees to the following conditions:

1. To remove any and all identification of the Architect and consultants from title block prior to the use of the documents.
2. To add Contractor’s title block or the title block of Contractor’s supplier prior to reproducing the documents either electronically or in printed form.
3. Prior to reproducing any drawing, Contractor will verify the information and dimensions contained in the documents and assume the liability for the accuracy as if the drawings had been totally prepared by our own company.
4. Contractors agree that the use of these electronic files is specifically for this Project, these files will not be reproduced for any other project, and the Architect has not waived the Architect’s copyright or other reserved rights.
5. Contractors agree to release and indemnify the Owner, Architect, and Construction Manager and their consultants against any losses or claims as a result of any errors or omissions in the electronic data.
6. Electronic files are not construction documents. Differences may exist between the electronic files and corresponding hard-copy construction documents. The Architect and Owner make no representation regarding the accuracy or completeness of the electronic files. In the event that a conflict is discovered between the hard copy construction documents and the electronic files, hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists.
7. The use of the electronic files does not relieve the Contractor of fully complying with the Contract Documents or the need to check, confirm, and coordinate all dimensions and details, take field measurements, verify field conditions, and coordinate your work with that of other contractors for the Project.

F. See attached form “Attachment A – Agreement Between GKO Architects and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media.”

G. See attached form “Attachment B – Agreement Between K&W Engineers and Contractor for Transfer of Computer Aided Drafting (CAD) Files on Electronic Media.”

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION – (Not Applicable)

END OF SECTION 01 31 26

GKO ARCHITECTS

300 BROOKSIDE AVENUE
AMBLER YARDS
BLDG. 18 – SUITE 150
AMBLER, PA 19002
TEL. 215.646.2003
www.gkoarchitects.com

To: _____

ELECTRONIC DATA TRANSFER RECEIPT

The data you have requested is not copy protected. You may make backup copies for your own use. IT IS ILLEGAL TO GIVE OR SELL COPIES OF THE DATA TO ANOTHER PERSON OR BUSINESS WITHOUT THE EXPRESSED WRITTEN CONSENT OF Godshall Kane O'Rourke Architects, LLC.

Any use by you, your subcontractors, your consultants, or others, will be at your sole risk and without liability or legal exposure to Godshall Kane O'Rourke Architects, LLC. Furthermore, you shall, to the fullest extent permitted by law, indemnify and hold harmless Godshall Kane O'Rourke Architects, LLC from all claims, damages, losses, including attorney fees arising out of or resulting there from.

Godshall Kane O'Rourke Architects, LLC grants no warranties express or implied, regarding the data, their accuracy or content, their fitness for any purpose, their quality, or their merchantability.

To the best of our knowledge, no computer viruses have been detected in this data.

Please endorse one copy of this release form and return it to Godshall Kane O'Rourke Architects, LLC as your acknowledgement of receipt of this data and acceptance of the terms outlined herein. Use in any form of the electronic data provided shall constitute acknowledgement of receipt and acceptance of the terms outlined herein. Upon receipt of this release we will email the files in zipped format to the email address provided below.

TO BE RECEIVED BY:

_____ _____

Print Name *Signature*

EMAIL Address: _____ **DATE:** _____

AUTHORIZED SIGNATURE _____ **DATE:** _____

Godshall Kane O'Rourke Architects, LLC

2201 North Front Street, Suite 200 :: Harrisburg, PA 17110 :: 717.635.2835 :: kandwengineers.com

AGREEMENT FOR DELIVERY OF FILES ON ELECTRONIC MEDIA

1. Kurowski & Wilson LLC (K&W) stands by the accuracy of the sealed drawings represented by these electronically recorded data files. These electronic files are not the sealed drawings that constitute K&W's work product for which K&W takes professional responsibility. In the event of a conflict between the sealed drawings and these electronic files, the sealed drawings shall govern.
2. Under no circumstances shall transfer of the drawings and other instruments of service on electronic media for your use be deemed a sale by K&W. K&W retains ownership and copyrights of the electronic files and all subsequent copies of the electronic files or derivative works, regardless of the form or media in or on which the original and other copies may exist.
3. The sealed drawings are our work product. Data stored on electronic media can deteriorate or be modified without our knowledge. Therefore, any use or reuse of these electronic data files and any drawings or information derived therefore is at your sole risk. We do not assume responsibility or liability for any modifications or reuse by others to such electronic files without our written verification for the specific purpose for a separate consideration. This transfer is not such a written verification.
4. Disclaimer of warranty: K&W makes no warranties, express or implied, with respect to the electronic files or their quality, performance, merchantability or fitness for any particular purpose. The electronic files are transferred and delivered "as-is". All warranties of any sort, express or implied are hereby disclaimed; including, but not limited to, fitness for a particular purpose or merchantability.
5. Indemnification. To the fullest extent allowed by law, you hereby agree to indemnify and hold harmless K&W from any damage, liability or cost, including reasonable attorney's fees and costs of defense, arising from; or, claimed to arise from, any use of, changes, additions, or modifications of any type, or from any reuse of the electronic files.
6. Limitation of liability: In no event will K&W be liable for any direct, incidental, indirect, special or consequential damages in connection with or arising out of the existence, furnishing, failure or use of the electronic files by anyone even if K&W has been advised of the possibility of such damages.
7. You will not use or permit anyone else to use any of the data contained in these electronic data files on any other project than the one identified.
8. Copy restrictions. The electronic files and any accompanying written materials are copyrighted. Unauthorized copying is expressly forbidden. You may be held legally responsible for any copyright infringement that is caused or encouraged by your failure to abide by the terms of this license. You may not copy the electronic files or accompanying materials to sell or distribute to others.
9. Should any of these conditions be found to be unenforceable by a court of competent jurisdiction, all other conditions shall be given effect.
10. I have read and understand the above terms and conditions. I represent that I have authority to bind, and do hereby bind, the transferee to the above terms and conditions.

AGREED:

RECIPIENT	K&W
_____ Signature of Recipient	_____ Signature of K&W Representative
_____ Printed Recipient Name / Title	_____ Printed Name / Title
_____ Date	_____ Date
_____ Recipient Company Name	_____ K&W Project Number / Name

SECTION 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for documenting the progress of construction, including:

1. Preliminary Construction Schedule.
2. Contractor's Construction Schedule.
3. Submittals Schedule.
4. Daily construction reports.
5. Material location reports.
6. Field condition reports.
7. Special reports.

B. All Work under the Contract Documents shall be planned, scheduled, executed, and reported using a cost- and resource-loaded Critical Path Method (CPM) schedule expressed in calendar days, excluding Saturdays, Sundays, and legal holidays.

C. General Scheduling Authority: The Site and Athletic Improvements Contractor is designated as the Project Coordinator unless noted otherwise. The provisions of the General Requirements, Division 01, and the directions of the Project Coordinator are to be followed by the Contractor in scheduling and coordinating construction activities. The scheduling Services of the Project Coordinator are part of its contract with the Owner, but nothing herein relieves the obligations of each Contractor to schedule their own construction activities, and nothing herein alters the obligation of each Contractor to resolve all supervision, coordination, and scheduling issues between and among the Sub-Contractors. In addition, the requirements for subordinate coordination responsibilities and scheduling per the Division 01 General Requirements must be followed by all contractors. The Construction Manager and Owner, at their sole discretion, may waive or modify any scheduling requirement including format, content, and complexity. Any such waiver shall not be grounds for a claim by the Contractor against the Owner, Construction Manager, or Architect.

D. Electronic Submission Standard: All schedules and updates shall be submitted in electronic format with no restrictions for viewing and analyzing, using the same software with which the schedule was created. Electronic files shall be submitted to the Construction Manager and to any Contractor the Construction Manager directs.

1.03 RELATED SECTIONS

A. Coordinate with the following Division 01 Sections:

1. Section 01 11 00 “Summary of the Project” for a summary of Owner-furnished products.
2. Section 01 12 00 “Multiple Work Scope Summary” for preparing a combined Contractor’s Construction Schedule.
3. Section 01 29 00 “Payment Procedures” for the Schedule of Values procedures and submission.
4. Section 01 31 00 “Project Management and Coordination” for meeting minutes; Prescheduling Conference.
5. Section 01 33 00 “Submittal Procedures” for schedule and report submissions; submittal review times.
6. Section 01 40 00 “Quality Requirements” for submission of a schedule of tests and inspections.
7. Section 01 77 00 “Closeout Procedures” for required Project Record Documents at closeout.

1.04 DEFINITIONS

A. Activity**:** A discrete, schedulable part of the Work that consumes time and resources. Activities include shop drawing preparation, construction operations, equipment testing, training, and any other action required for prosecution of the Work.

1. Critical Activity: An activity on the critical path that must start and finish on its planned early start and finish dates.
2. Predecessor Activity: An activity that must be completed before a given activity can begin.
3. Successor Activity: An activity that follows another activity in the network.

B. CPM (Critical Path Method): A scheduling method in which activities are arranged based on their logical relationships. Network calculations determine when activities can be performed and identify the critical path.

C. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration. Activities on the critical path have the lowest total float value.

D. Event: The starting or ending point of an activity.

E. Float**:** The measure of leeway in starting and completing an activity.

1. Float belongs to the Owner and may be assigned only with the Owner’s representative’s approval.
2. Free Float: The amount of time an activity can be delayed without adversely affecting the early start of the immediately following activity.
3. Total Float: The amount of time an activity can be delayed without adversely affecting the planned Project completion date.

F. Fragnet: A partial or fragmentary network used to break down activities into smaller activities for greater detail, or to analyze the impact of a change.

G. Major Area: A story of construction, a separate building, or a similar significant construction element.
H. Milestone: A key or critical point in time used for reference or measurement.
I. Network Diagram: A graphic diagram of a network schedule showing activities and their relationships.
J. Notice to Proceed (NTP): The written notice from the Owner or Construction Manager authorizing the Contractor to begin the Work and establishing the date from which Contract Time is measured.
K. Resource Loading: The allocation of manpower and equipment to each activity as required to complete it within its scheduled duration.
L. Schedule of Values: A statement furnished by the Contractor allocating the entire Contract Sum among the various portions of the Work, used as the basis for reviewing Applications for Payment.

1.05 SUBMITTALS

A. Submittals Schedule: Submit within twenty business (20) days in tabular format including the following for each submittal:

1. Scheduled date for first submittal.
2. Specification Section number and title.
3. Submittal category (action or informational).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect's and all consultants' and agencies' final release or approval.

B. Preliminary Construction Schedule: Submit one (1) electronic copy within ten (10) business days of the Notice to Proceed.
C. Preliminary Construction Schedule Network Diagram: Submit one (1) electronic copy, at a scale large enough to show the entire network for the entire construction period. Show logic ties for all activities.
D. Final Construction Schedule: Submit one (1) electronic copy no later than twenty (20) business days of approval of the Preliminary Project Schedule. Label each submittal to identify the schedule type (initial or updated) and date.
E. Final Construction Schedule Reports: Submit one (1) copy of each of the following computer-generated reports with the Final Construction Schedule. Each activity entry shall include: activity number, description, original duration, remaining duration, early start, early finish, late start, late finish, and total float in calendar days.

1. Activity Report: All activities sorted by Project Phase, Project Area, Prime Contractor, then early start date. Include duration, cost, and total float for each activity.
2. Logic Report: Preceding and succeeding activities for all activities, sorted in ascending order by activity number, then early start or actual start date if known.

F. Field Reports — Submission Frequency:

1. Daily Construction Reports: Submit electronically via the Procore Daily Log tool on a daily basis. Incomplete or late reports may result in partial withholding of monthly payment applications.
2. Material Location Reports: Submit one (1) electronic copy at monthly intervals.
3. Field Condition Reports: Submit one (1) electronic copy immediately upon discovery of differing conditions.
4. Special Reports: Submit one (1) electronic copy within one (1) day of an unusual event.

1.06 QUALITY ASSURANCE

A. Prescheduling Conference: Before schedule preparation begins, conduct a conference at the Project site per Division 01 Section 01 31 00. Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule. Agenda shall include, at minimum:

1. Software limitations; report content and format.
2. Availability of qualified scheduling personnel.
3. Project constraints: phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
4. Owner-furnished product delivery dates.
5. Work of Owner's separate contracts.
6. Submittal and resubmittal review times per Section 01 33 00.
7. Test and inspection requirements.
8. Time required for completion and startup procedures.
9. Final list of construction activities to be included in the schedule.
10. Schedule update procedures.

1.07 COORDINATION

A. Coordinate the preparation and processing of all schedules and reports with the performance of construction activities and with the scheduling and reporting obligations of separate contractors.
B. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
C. Secure time commitments for performing critical elements of the Work from all parties involved.
D. Coordinate each construction activity in the network with all other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 SUBMITTALS SCHEDULE

A. Preparation: Submit a Submittals Schedule arranged in chronological order by dates required by the construction schedule. When establishing dates, include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery.
B. Coordinate the Submittals Schedule with the list of subcontracts, Schedule of Values, and Contractor's Construction Schedule.
C. Initial Submittal: Submit concurrently with the Preliminary Construction Schedule. Include all submittals required during the first ninety calendar (90) days of construction and those required early due to long lead times for manufacture or fabrication.
D. Final Submittal: Submit concurrently with the first complete submittal of the Contractor's Construction Schedule.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE — GENERAL REQUIREMENTS

A. Procedures: Comply with the Associated General Contractors' publication "Construction Planning and Scheduling."
B. Time Frame: Extend the schedule from the date established for the Notice to Proceed to the date of Final Completion. Contract completion dates shall not be changed by submission of a schedule showing an early or late completion date unless specifically authorized by Change Order.
C. Activity Requirements: Each activity on the network shall include:

1. Duration: A single duration of no more than twenty (20) working days, representing the best estimate of elapsed time for the scope of work involved. Normal holidays and anticipated weather delays shall be incorporated. One critical path shall be shown for the schedule.
2. Identification Number: Assigned to each activity in a format acceptable to the Project Coordinator.
3. Description: A brief, definitive description of the activity. If not sufficiently definitive, a separate listing with a descriptive narrative shall be provided.
4. Procurement Activities: Long-lead and major procurement items requiring more than forty (40) calendar days shall be included as separate activities covering submittals, approvals, purchasing, fabrication, and delivery.
5. Submittal Review Time: Include review and resubmittal times per Division 01 Section 01 33 00. Coordinate with the Submittals Schedule.
6. Substantial Completion: Show completion in advance of the Substantial Completion date and include time for Architect's and Owner's administrative procedures required for certification.

D. Constraints: Include all constraints and work restrictions in the schedule and show how each affects the sequence of Work, including:

1. Phasing: Arrange activities by phase.
2. Multiple Contracts: Include separate activities for each prime contract and for each portion of Work performed by the Owner.
3. Products Ordered in Advance and Owner-Furnished Products: Include a separate activity for each product. Reference included Project Phasing Schedule Dates stipulate the earliest possible delivery.
4. Work Restrictions: Show the scheduling effect of coordination with existing construction, occupancy limitations, uninterruptible services, partial occupancy

before Substantial Completion, use-of-premises restrictions, provisions for future construction, seasonal variations, and environmental controls.

5. Work Stages: For each Phase, indicate stages of construction including subcontract awards, submittals, purchases, mockups, fabrication, sample testing, deliveries, installation, shop and field tests and inspections, traffic pattern changes, moving and occupancy timeframes, adjusting, curing, startup and placement into final use and operation, and punchlist.
6. Area Separations: Identify each major area of construction per Phase and show where activities must be sequenced to meet the following milestone dates: Foundation Completion, Structural Completion, Permanent Space Enclosure, Completion of Mechanical Installation, Completion of Electrical Installation, and Substantial Completion.

E. Milestones and Phases: Include all milestones and phases identified in the Contract Documents, including Notice to Proceed, Individual Phase Completions, Substantial Completion, Final Completion, and all interim milestones listed in the Contract Documents.

F. Contract Modifications: For each proposed contract modification, prepare a time-impact analysis using fragnets concurrently with the modification submission to demonstrate the effect of the proposed change on the overall Project schedule.

2.03 PRELIMINARY CPM CONSTRUCTION SCHEDULE

A. Format: Submit a preliminary horizontal bar-chart schedule within ten (10) business days of the Notice to Proceed.

B. Content: Show each significant construction activity separately. Identify the first workday of each week with a continuous vertical line. Include construction activities for the first ninety (90) days.

2.04 FINAL CPM CONSTRUCTION SCHEDULE

A. Format: Prepare the Contractor's Construction Schedule as a computerized, time-scaled CPM network analysis diagram. Use "one workday" as the unit of time. Include a list of all non-working days and holidays.

1. The final Project schedule must be completed within 20 business days of approval of Preliminary Project schedule.
2. Train and inform key Project personnel, including each contractor's personnel, in proper methods of providing data and using CPM schedule information.
3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

B. Preparation:

1. Prepare a complete list of activities required to complete the Work and develop a network diagram from the preliminary schedule to identify all critical paths.

2. For each activity, indicate estimated time duration, sequence requirements, and relationships to other activities. Include within each Phase: preparation and processing of submittals, mobilization and demobilization, purchase of materials, delivery, fabrication, utility interruptions, installation, Owner's Work, and testing and commissioning.
3. Identify critical path activities, including those for interim Phase completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
4. Process data to produce output on a computer-drawn, time-scaled network. Revise and reproduce as necessary to produce an acceptable schedule within Contract Time.
5. Format: Mark the critical path and locate it near the center of the network. Locate paths with the most float near the edges.

C. Network Diagram Requirements: The CPM schedule shall be in the form of a time-scaled precedence diagram, flowing continuously from left to right, and shall include:

1. A shop drawing and submittal schedule noting submittal, approval, order, fabrication, and delivery durations.
2. Integration of the submittal schedule with installation activity logic to show the effect of delivery on installation.
3. Planned progression of construction showing activities, durations, and interim milestone dates for each contract phase.
4. Logic restraints that clearly identify interrelationships of work, crew, and trade flow.
5. CPM logic diagrams summarized in a bar chart format capable of displaying current progress for all Work.
6. A computerized mathematical analysis of CPM logic showing activity duration, early and late start and finish dates, tasks critical to completion, and interim milestone dates on a monthly basis.
7. Crew sizes and planned labor hours for each activity.

D. Weather Calendar: The CPM schedule shall include a weather calendar showing non-working days beyond standard weekends and holidays to account for anticipated inclement weather for the project area.

E. Initial Schedule Issue: Prepare the initial network diagram from an early-start/total-float sort. Identify critical activities and prepare tabulated reports showing:

1. Contractor or subcontractor and the Work or activity.
2. Description of activity.
3. Principal events of activity.
4. Immediately preceding and succeeding activities.
5. Early and late start dates.
6. Early and late finish dates.
7. Activity duration in workdays.
8. Total float or slack time.
9. Dollar value of activity (coordinated with the Schedule of Values).

F. Schedule Updating — Monthly Tabulated Reports: Concurrently with each schedule revision, prepare tabulated reports and updated electronic files on a monthly basis showing:

1. Activities that have changed.
2. Original Duration
3. Predecessors/Predecessor Lag.
4. Successors/Successor Lag..
5. Calendars

2.05 FIELD REPORTS

A. Contractor is to submit Daily Construction Reports on a daily basis to the Owner's Representative using the Daily log tool in Procore. Failures to maintain timely or complete reports may result in partial withholding of monthly payment applications.

2.06 SPECIAL REPORTS

A. Submit special reports directly to the Owner within one (1) day of an occurrence. Distribute copies to all affected parties.
B. When an unusual or significant event occurs at the Project site, whether or not directly related to the Work, prepare and submit a special report documenting: the chain of events, persons involved, Contractor's response and personnel actions, evaluation of results or effects, and similar pertinent information. Advise the Owner in advance when such events are known or predictable.

PART 3 - EXECUTION

3.01 PROJECT COORDINATOR RESPONSIBILITIES

A. The Site and Athletic Improvements Contractor is designated as the Project Coordinator unless the Contract Documents state otherwise. The Project Coordinator is responsible for making all coordination decisions not mutually agreed to by all affected Prime Contractors.
B. Disputes between or among the Project Coordinator and one or more other Prime Contractors and disputes in connection with the construction schedule, the furnishing of additional resources to meet the Project schedule, job coordination, and all aspects of the means and methods shall be submitted promptly to the Project Coordinator for a final construction decision. The Project Coordinator and all affected Prime Contractor(s) shall, in connection with all submissions for a final construction decision, simultaneously provide written notice to the Construction Manager of any such submissions. The final construction decision of the Project Coordinator must, at all times, be consistent with the content and intent of the Contract Documents and the latest accepted schedule.
C. If the Owner or Construction Manager determines that substantial interests are at risk due to the Project Coordinator's final construction decision, the Owner or Construction Manager reserves the right to overrule it. The exercise of discretion by the Owner or Construction Manager in this regard shall be unchallengeable except upon a finding of abuse of discretion. In all other instances, the Project Coordinator's final construction decision shall be observed and followed by all Prime Contractors and their Subcontractors, even pending any litigation between Prime Contractors.

D. The damage remedy available to the Project Coordinator or any other Prime Contractor shall be the exclusive remedy for disputes between contractors. No Contractor, including the Project Coordinator, shall have any right of action against the Owner, Architect, or Construction Manager in connection with such disputes.

E. As Project Coordinator, the Site and Athletic Improvements Contractor shall:

1. Attend and chair meetings at least every two weeks during construction with all separate contractors, the Owner, the Architect, and Construction Manager to review progress and to plan and coordinate the activities of each separate contractor with the Work of the Contractor and of the Owner.
2. Ensure that reporting related to the Owner, Architect, and Construction Manager delays, or potential delays.
3. Formulate and recommend plans, including a revised Project schedule, to prevent, minimize, or recover from delays.
4. Make recommendations regarding requests for extensions of time and their effect on the Project schedule.
5. Revise the Project schedule to reflect Owner-granted time extensions.
6. Resolve objections from other contractors and make schedule adjustments mutually agreeable to all Prime Contractors and the Owner.
7. Prepare monthly schedule updates comparing actual progress to scheduled progress.

3.02 CONTRACTOR SCHEDULING OBLIGATIONS (ALL CONTRACTORS)

A. All Contractors other than the Project Coordinator shall:

1. Within ten (10) business days after the Notice to Proceed, submit a preliminary construction schedule to the Project Coordinator and Construction Manager in a form compatible with the requirements herein, showing the Contractor's Work and all activity interdependencies with other contractors. If not accepted, revise and resubmit promptly per the recommendations of the Owner, Architect, Construction Manager, and Project Coordinator.
2. Within twenty (20) business days of approval of Preliminary Project schedule, submit a final construction schedule to the Project Coordinator and Construction Manager for incorporation into the overall Project schedule.
3. Cooperate and participate with the Project Coordinator and other contractors in all activities described in this Section.
4. Notify the Project Coordinator, Owner, and Construction Manager in writing of any objection to the Project construction schedule or any revision within two (2) business days of receipt. Failure to provide timely written notice constitutes waiver of any objection, and the Contractor shall comply with the schedule. If a timely objection is made, the Contractor and Project Coordinator shall resolve it within ten (10) business days. If unresolved, the Owner may appoint the Construction Manager or an independent scheduling consultant whose decision shall be final and binding. All costs of resolving the objection shall be borne equally by the Contractor, the Project Coordinator, and their respective Sureties.
5. Not claim damages against the Owner or any adjustment in Contract Time or Contract Sum arising from the Project construction schedule, any revision, or any resolution of a schedule objection.

6. Acknowledge that the Owner has no duty to cause the Project Coordinator to perform competently, and that any claim arising from the Project Coordinator's failure to perform shall be solely against the Project Coordinator.

B. Early Completion: If any Contractor intends to complete the Work, or any portion thereof, earlier than any applicable Completion Date, it shall provide timely written notice to all other Contractors, the Project Coordinator, and the Construction Manager. The Project Coordinator has discretion to accept or reject such a plan. Earlier completion shall be promoted wherever feasible without affecting Work quality as determined by the Construction Manager. All Contractors shall cooperate and accelerate work as determined by Project Coordinator unless quality of work is affected as determined by the Construction Manager. No claims for acceleration to complete early or to meet project schedule will be considered.

C. Schedule Compliance and Costs: All costs associated with completing the Work within the Contract Time — including shift work, overtime, and premium time — shall be included in each Contractor's bid. Failure to include such costs in the bid does not relieve the Contractor of the obligation to use whatever means are necessary to meet Contract schedules. The Construction Manager, Architect, and Owner reserve the right to withhold monthly payment applications until the Contractor achieves schedule compliance. No claims for additional costs associated with completing the Work within Contract time frames will be considered.

D. Contractor Approval and Certification: Approval by the Contractor of any schedule or schedule revision constitutes the Contractor's representation that the schedule is a true and accurate plan to complete the Work, that it includes all Change Orders in the Contractor's possession, that it fully complies with the Contract Documents, and that the Contractor has coordinated and obtained concurrence from all affected parties.

E. Failure to Cooperate: The Contractor's failure to cooperate and participate in the development and review of construction schedules and updates as required by this Section shall be a material breach of the Contract, entitling the Owner to exercise all rights and remedies under the Contract Documents and applicable law.

3.03 NETWORK REQUIREMENTS

A. The CPM Schedule shall show the order and interdependence of all activities and the sequence in which the Work is to be accomplished. The schedule shall follow a time-scaled precedence format, with the network diagram flowing continuously from left to right.

B. Contractor's Responsibility: Failure to include in the CPM schedule any element of Work required under this Contract shall not excuse the Contractor from completing all Work within the applicable completion time, notwithstanding the Owner's network review.

C. Early Completion Float: A CPM schedule showing completion prior to the contractual completion date may be accepted, but shall not serve as a basis for any delay claim or cost reimbursement against the Owner. The period between the Contractor's baseline accepted CPM schedules projected completion date and the contractual completion date, if any, shall be treated as Project Float, available to the Owner to utilize as per Article 3.8.

D. Unacceptable Schedule: If a submitted CPM Schedule shows a work plan that will not complete the Work within the Contract Time, the Contractor shall revise and resubmit

until an acceptable schedule is produced. Failure to submit an acceptable schedule may, at the Owner's sole discretion, justify withholding of partial payments.

E. Owner's Non-Representation: Acceptance of the schedule does not constitute the Owner's representation that the Work can be completed as shown on the schedule.

F. Project Schedule Submittal and Approval: The Contractor shall submit the Project Schedule for all Work in conformance with the project schedule requirements listed in the project manual, including all phasing and milestones provided. The Project Coordinator shall incorporate all contractors' Work items and issue the consolidated Project schedule. Upon written approval of the schedule by the Contractor and Construction Manager, and review by the Architect, the schedule shall become the essence of the Contract with respect to time. Non-compliance may constitute a violation of the General Conditions article governing Delays and Extension of Time. The Project schedule may be revised only with written consent of the Construction Manager, Owner, and Architect. Non-compliance with scheduling requirements may result in a deduction of $800.00 per day from the Contract amount as a schedule administration charge; this deduction is in addition to, and does not limit, any other rights or remedies of the Owner under the Contract Documents, including enforcement of the General Conditions article governing Termination or Suspension by the Owner. No payment applications will be processed without an approved Project schedule accepted by all contractors.

G. Owner's Liability: Preparation, review, enforcement, and updating of the Project schedule do not make the Owner, Construction Manager, or Architect liable to the Contractor for time overruns, cost overruns, or schedule changes required to maintain Contract completion and milestone dates.

H. Contractor's Responsibility for Schedule Logic: The Contractor is solely responsible for determining the sequence and logic of activities, time estimates, and means and methods for its portion of the Work. The Construction Schedule shall represent the Contractor's best judgment of how it will prosecute the Work in compliance with the Contract Documents. Contractor shall ensure that the Construction Schedule is current and accurate and is properly and timely monitored, updated, and revised as Project conditions and the Con-tract Documents may require, and as may be directed by Project Coordinator

I. Subcontractor Coordination: The Contractor shall consult with its major Subcontractors when preparing the Construction Schedule. Major Subcontractors shall receive copies of relevant schedule portions and shall be continuously advised of updates. Submission of the schedule by the Contractor to the Project Coordinator constitutes confirmation that the Contractor has coordinated with and received concurrence from its major Subcontractors.

J. Milestone Dates: Completion and Milestone Dates in the Contract Documents are Contract requirements and are of the essence to the Contract. They represent the latest allowable completion times for the respective portions of the Work, not a complete listing of all interfaces. The Contractor shall determine all interface time requirements and shall plan, schedule, and coordinate accordingly.

3.04 SCHEDULE UPDATES

A. Monthly Schedule Update Meeting: A Schedule Update Meeting shall be held one (1) week prior to each monthly progress meeting at the Project site. The Project Coordinator and all Contractors shall attend. Actual progress for the previous month shall be recorded, future activities reviewed, and activity durations and logic connections revised

as needed. Decisions agreed to by all parties are binding; contractual completion dates may be modified only through formal written requests accepted per the Contract Documents. Each Contractor shall provide, at a minimum:

1. Actual start and finish dates for all completed activities.
2. Actual start dates and estimated remaining durations for all activities in progress.

B. Monthly Progress Status Report: Submit an electronic copy of each monthly schedule update to the Construction Manager at the end of each month. The report shall include:

1. Revisions to the Construction Schedule since the previous submittal.
2. Work completed during the reporting period.
3. A printed copy of the entire updated schedule showing early and late dates, activity durations, predecessors, successors, and a list of logic and duration changes.
4. Work anticipated to start in the next period, including activities already in progress.
5. Problem areas, anticipated delays, and their impact on the schedule.
6. Recommended corrective action and its effect.
7. Effect of changes on schedules of other Prime Contractors.
8. Updated tabulation of Contract Time and a printed copy of the project critical path.
9. Overall evaluation of Project schedule status.

C. Application for Payment: Submission and acceptance of progress updates and progress reports are a prerequisite to Applications for Payment. The Contractor shall not be entitled to any progress payment until it has fully complied with the requirements of this Section.

D. Schedule Distribution: Distribute approved copies of the schedule to the Architect, Construction Manager, Owner, separate contractors, testing and inspecting agencies, and all parties with schedule responsibility. Post copies in Project meeting rooms and field offices. Update distribution whenever the schedule is revised; remove parties once their Work is complete.

E. CPM Schedule as Payment Basis: The CPM schedule shall be used to monitor progress and as the basis for monthly payments. Each Contractor shall provide all sequencing, logic, and duration information and the initial logic network diagram. Once accepted, the Contractor shall provide monthly update information including logic, percent complete, actual start and finish dates, and duration changes. The Project Coordinator shall produce computerized schedule printouts using information provided by all Contractors, and distribute updated schedules at progress meetings.

F. Schedule Integrity: Each Contractor's initial schedule and all updates shall represent that Contractor's and its Subcontractors' best efforts as to how the Work will be accomplished. All progress information shall accurately reflect actual performance. Once accepted, adherence to the CPM schedule is obligatory.

G. Work Commencement and Execution: Work shall begin on the date in the Notice to Proceed and shall be executed with sufficient progress to prevent delay to other Contractors or to the Project's overall completion. Each Contractor shall at all times schedule and direct its Work to provide an orderly progression to completion within the Contract Time.

H. Items not ordered by the Contractor in a timely manner for incorporation into the Work will not be considered as grounds for claims for additional time or costs.

3.05 SCHEDULE REVISION PROCEDURE

A. When a formal schedule revision is required — whether directed by the Owner, Construction Manager, or Project Coordinator, or triggered by the recovery schedule process under Article 3.6 — the Contractor shall prepare and submit a revised schedule meeting all of the following requirements:

1. The revised schedule shall be prepared to the same level of detail, format, and software requirements as the accepted baseline CPM schedule per Article 2.4.
2. The Contractor shall submit a written narrative explaining the basis for each change in activity logic, duration, sequence, or resource allocation.
3. The revised schedule shall be submitted to the Project Coordinator by the Prime Contractor initialing the change within five (5) business days of the directive or triggering event for incorporation by the Project Coordinator into the overall Project Schedule. This shall be for all cases unless a different time is specified in writing by the Construction Manager.
4. The Project Coordinator shall review and incorporate all Prime Contractors' revised work items and issue a consolidated revised Project schedule within five (5) business days of receipt of all Contractor submissions.
5. The revised schedule shall be reviewed and accepted by the Construction Manager and Owner prior to use. Acceptance does not modify Contract Time or Contract Sum unless effected by Change Order.

B. No revision to the Project schedule shall constitute grounds for an adjustment in Contract Time or Contract Sum unless such adjustment is agreed to by the Owner and authorized by Change Order.

3.06 RECOVERY SCHEDULES

A. Trigger: If the updated Construction Schedule shows, in the Construction Manager's sole opinion, that any Contractor is ten (10) or more calendar days behind schedule for any Completion Date, that Contractor shall, within five business (5) days of written notice from the Construction Manager, prepare and submit a recovery schedule at no cost to the Owner explaining and displaying how Contractor intends to reschedule his Work in order to regain compliance with the Construction Schedule during the immediate subsequent pay period. The Contractor shall also coordinate required schedule changes with the Project Coordinator for incorporation into the overall schedule.

B. Recovery Period: If the Contractor believes all lost time can be recovered within one pay period, it shall prepare a limited-duration recovery schedule as set forth herein. If recovery will require more than thirty (30) days, the Contractor shall instead prepare and submit a formal schedule revision per Article 3.5.

C. Recovery Schedule Content: The recovery schedule shall be prepared to the same level of detail as the Construction Schedule, for a maximum duration of one month, incorporating the best available information from Subcontractors and others. It shall be prepared in coordination with all other Prime Contractors.

D. Review Conference: Within two business (2) days after submission of a recovery schedule, the Contractor shall participate in a conference with the Project Coordinator and Construction Manager to review and evaluate it. Within two business (2) days of that

conference, the Contractor shall submit any required revisions for acceptance. The Contractor shall then execute the Work per the accepted recovery schedule.

E. Ongoing Assessment: Each Contractor shall confer continuously with the Project Coordinator to assess recovery effectiveness. If the Construction Manager determines the Contractor remains behind schedule, the Project Coordinator shall direct preparation of a formal schedule revision per Article 3.5. If the Project Coordinator determines the Contractor has successfully complied with the recovery schedule, it shall direct the Contractor to return to the accepted Construction Schedule.

F. Nothing in this Article alters the Project Coordinator's obligation to resolve coordination and scheduling disputes among Prime Contractors.

3.07 CAUSES FOR EXTENSIONS OF TIME

A. General: Contract Times will be adjusted only for causes specified in this Contract. Any Contractor requesting an extension of Contract Time shall provide justification and supporting evidence as required elsewhere in the Contract Documents. Delays to activities that do not affect any Contract completion date shown on the critical path shall not be the basis for a change in Contract Time.

B. Weather Delay Extensions: Extensions for weather delays shall be granted only upon satisfaction of all of the conditions listed in Section 15.1.6.2 of the General Conditions.

3.08 OWNER-INITIATED SCHEDULE ADJUSTMENTS

A. The Owner may direct schedule adjustments due to job conditions, acts or omissions of other contractors, acts of God, technical difficulties, unavoidable Owner delays, or other unforeseeable conditions. Under such conditions, Owner shall direct Contractor to reschedule the Work to reflect the changed conditions, and the Contractor shall revise its schedule accordingly per Article 3.5. Only the Owner, in writing, may grant schedule extensions that affect Contract Time. No additional compensation shall be paid for such adjustments except for unavoidable overall Contract delays, in which case the Contractor shall take all possible action to minimize the time extension. Available Project Total or Free Float may be applied by the Owner to accommodate adjustments without requiring a formal time extension.

B. Owner's Corrective Measures: If the Owner determines that the Work has not progressed to the required level of completion, the Owner may order the Contractor to take corrective measures including: working additional shifts or overtime; supplying additional manpower, equipment, and facilities; engagement of a scheduling consultant (cost to be allocated among responsible parties by the Architect and Construction Manager in their sole discretion); and other similar measures. Such measures shall continue until progress complies with the required level of completion. The Owner's right to require these measures shall not impose any duty or obligation to the Contractor or its Surety.

    1. If the Contractor has not caused or contributed to the failure to progress, it shall be entitled to a Change Order for the reasonable additional labor cost of Owner-directed overtime or shift work.
    2. If the Contractor has caused or contributed to the failure to progress, the Contractor and its Surety shall be liable for all costs incurred by the Owner,

including the cost of any overtime or shift work by the Owner or separate contractors.

3. If the Contractor fails to perform as Project Coordinator adequately or to the Owner's satisfaction, the Owner may appoint a substitute Project Coordinator chosen from the separate contractors or an independent consultant. The cost of the substitute Project Coordinator shall be charged to and borne by the Contractor and its Surety.

3.09 FLOAT TIME

A. Float belongs to the Owner. The Owner may initiate changes that absorb available float without any obligation to extend overall or intermediate completion dates. Owner-initiated changes that affect the critical path on the CPM network shall be the sole grounds for extending or shortening those dates.

B. Contractor-initiated changes that encroach on total float may be accomplished with the Owner's concurrence but shall give way to any competing Owner-initiated change requiring the same float.

END OF SECTION 01 32 00

SECTION 01 33 00 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for submitting Applications for Payment.
2. Division 01 Section "Closeout Procedures" for submitting warranties and Project Record Documents.

1.03 DEFINITIONS

A. Action Submittals: Written and graphic information that requires Engineer's responsive action.
B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.04 SUBMITTAL PROCEDURES

A. General: Prepare and submit Action Submittals required by individual Specification Sections.
B. Submit each submittal online, via Procore, where the Construction Manager, and/or Engineer will review and return electronically to the contractor. Mark up and retain one (1) returned copy as a Project Record Document.
C. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal via Procore with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of a need to review submittals concurrently for coordination.

a. Construction Manager/Engineer or Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

D. Submittals Schedule: Comply with requirements in Division 01 for list of submittals and time requirements for scheduled performance of related construction activities. The Construction Manager will coordinate the initial submittal schedule between the Primes and the Architect/Engineer. The Construction Manager will then post all submittals from the final submittal schedule and set up the workflow in Procore.

E. Processing Time: Allow enough time for submittal review, including time for resubmittals. Construction Manager / Engineer shall have 3 weeks collectively to return submittal reviews.

F. Identification: Place a permanent label or title block on each submittal for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 4 by 5 inches (100 by 125 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Engineer.
3. Include the following information on label for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and address of Engineer.
    d. Name and address of Contractor.
    e. Name and address of subcontractor.
    f. Name and address of supplier.
    g. Name of manufacturer.
    h. Unique identifier, including revision number.
    i. Number and title of appropriate Specification Section and paragraphs.
    j. Drawing number and detail references, as appropriate.
    k. Other necessary identification.

G. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals. No substitutions will be accepted without approval by addendum prior to bid.

H. Additional Copies: Unless additional copies are required for final submittal, and unless Engineer observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies (if applicable) via Procore.
2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

I. Transmittal: Package each submittal individually and appropriately for transmittal and handling via the required submittal log within Procore. Construction Manager/Engineer will return submittals, without review, that are received from sources other than assigned Contractor.

1. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Construction Manager/Engineer on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and

limitations. Include the same label information as the related submittal.

2. Include Contractor's certification stating that information submitted complies with requirements of the Contract Documents.

J. Distribution: Furnish copies (if required) of final submittals to manufacturers, subcontractors, suppliers, fabricators, and installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals with mark indicating action taken by Construction Manager/Engineer in connection with construction.

PART 2 – PRODUCTS

2.01 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

1. Submit each submittal online with cover sheet as indicated above, via Procore, where the Construction Manager and/or Engineer will review and return electronically to the contractor. Mark up and retain one (1) returned copy as a Project Record Document.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. Submit individually as identified with Procore.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer’s written recommendations.
b. Manufacturer's product specifications
c. Manufacturer’s installation instructions.
d. Standard color charts.
e. Manufacturer’s catalog cuts.
f. Wiring diagrams showing factory-installed wiring.
g. Printed performance curves.
h. Operational range diagrams.
i. Mill reports.
j. Standard product operating and maintenance manuals.
k. Compliance with recognized trade association standards.
l. Compliance with recognized testing agency standards.
m. Application of testing agency labels and seals.
n. Notation of coordination requirements.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Include the following information, as applicable:
    a. Dimensions.
    b. Identification of products.
    c. Fabrication and installation drawings.
    d. Roughing-in and setting diagrams
    e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    f. Shopwork manufacturing instructions.
    g. Templates and patterns.
    h. Schedules.
    i. Design calculations.
    j. Compliance with specified standards.
    k. Notation of coordination requirements.
    l. Notation of dimensions established by field measurement.
2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
3. Submit electronic copies of each submittal and cover sheet, unless prints are required for operation and maintenance manuals. Submit four (4) prints where prints are required for operation and maintenance manuals. Construction Manager/Engineer and CM will each retain one (1) print; remainder will be returned. Mark up and retain one (1) returned print as a Project Record Drawing.

D. Samples: Prepare physical units of materials or products, including the following:

1. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.
2. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
3. Submit Samples for review of kind, color, pattern, and texture for a final check of these characteristics with other elements and for a comparison of these characteristics between final submittal and actual component as delivered and installed.
    a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least three sets of paired units that show approximate limits of the variations.
        1) Provide sample substitutions where applicable if samples do not meet standards or are not approved due to an issue with quality, quantity, etc.
    b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, and details of assembly, connections, operation, and similar construction characteristics.

4. Number of Samples for Initial Selection: Submit one (1) full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Engineer will return submittal with options selected.
5. Disposition: Maintain sets of approved Samples at Project site, available for quality- control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

PART 3 – EXECUTION

3.01 CONTRACTOR'S REVIEW

A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Engineer.
B. Approval Stamp: Stamp each submittal with a uniform approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.02 CONSTRUCTION MANAGER’S/ENGINEER'S ACTION

A. General: Construction Manager/Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
B. Action Submittals: Construction Manager/Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it within 3 weeks. Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken.
C. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 01 33 00

SECTION 01 40 00 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for quality assurance and quality control.
B. This Section specifies the general requirements for testing and inspection services. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Cooperate with Owner's testing laboratory and all others responsible for testing and inspecting the Work.
D. Provide other testing and inspecting as specified to be furnished by the Contractor in this Section and/or elsewhere in these Specifications.
E. Provide quality control by the observation and acceptance of work by others being built upon.
F. Related work described elsewhere:

1. See Divisions 02 through 33 for specific test and inspection requirements.
2. Where no testing requirements are described, but the Engineer/Architect and/or Construction Manager decides that testing is required, they may direct that such testing be performed under current standards for testing and the General Conditions.

G. Selection of testing laboratory: The Owner shall hire and pay for an independent testing laboratory.

1.03 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and ensure that proposed construction complies with requirements.
B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.
C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.04 SUBMITTALS

A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
2. Description of test and inspection.
3. Identification of applicable standards.
4. Identification of test and inspection methods.
5. Number of tests and inspections required.
6. Time schedule or time span for tests and inspections.
7. Entity responsible for performing tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

D. Reports: Prepare and submit certified written reports that include the following:
1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Ambient conditions at time of sample taking and testing and inspecting.

11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

E. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
B. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance.
E. Registered Engineer Qualifications: A registered Engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing Engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

    1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.

G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

H. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.

1. Contractor responsibilities include the following:

a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
d. When testing is complete, remove assemblies; do not reuse materials on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor and Construction Manager. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.06 QUALITY CONTROL

A. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.

1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 72 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

B. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.

3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Testing agency will retest and reinspect corrected work at the expense of the Contractor.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
5. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field-curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.07 CODES AND STANDARDS

A. Testing, when required, will be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials (ASTM).

1.08 REVIEW OF THE CONTRACT DOCUMENTS

A. On all Project Drawings, figures take precedence over measurement by scale, and any scaling is done at the Contractor's own risk. Before ordering any materials or performing any Work, the Contractor shall verify all measurements at the project site and be responsible for the correctness of same.
B. Promptly respond to test reports and related instructions to ensure necessary retesting and replacement of materials with the least possible delay in progress of the Work.

1.09 FIELD CONDITIONS

A. The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions with the Contract Documents and any shop drawings and product data before commencing any related work. Errors, inconsistencies, or omissions shall be reported to the Engineer/Architect and/or the Construction Manager at once.

1.10 PAYMENT FOR TESTING

A. Initial Services: The Owner's Testing Laboratory shall be responsible for initial testing services as outlined in various sections and the General Conditions.
B. Re-Testing Services: When initial tests indicate non-compliance with the Contract Documents, all subsequent retesting occasioned by the non-compliance shall be performed by the same testing agency and the costs thereof will be borne by the Contractor responsible for the work that is non- compliant.

1.11 TESTING

A. Code Compliance Testing: Inspections and tests required by codes or ordinances, or by a plan approval authority, and which are made by a legally constituted authority, shall be the responsibility of and shall be paid for by the Contractor, unless otherwise provided in the Contract Documents.
B. Contractor's Convenience Testing: Inspecting and testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor.

1.12 INSPECTION

A. Inspection by Owner's Personnel: From time to time, personnel in the employ of the Owner may inspect the Work where the Work is in progress but shall have no authority to direct the Contractor or request changes in the Work except through the Engineer/Architect and/or the Construction Manager.
B. Inspection of Work by Others: Each Contractor shall inspect Work of others which will receive or is adjacent to his Work before commencing his Work. Do not proceed until conditions which would result in a less than first class installation are satisfactorily corrected. Commencing Work shall be construed as acceptance of the Work of others, by the Contractor, as satisfactory to receive his Work. The Contractor shall bear all costs to correct the unsatisfactory Work.

1.13 COOPERATION WITH TESTING LABORATORY

A. Representatives of the testing laboratory shall have access to the Work at all times. Provide facilities for such access in order that the laboratory may properly perform its function.
B. Specimens and samples for testing, unless otherwise provided in the Contract Documents, will be taken by the testing personnel. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.
C. Test results and reports shall be furnished simultaneously to the Engineer/Architect and the Owner/Construction Manager through Procore within one (1) week of testing.

1.14 TESTING SCHEDULE

A. The Owner shall pre-qualify and identify qualified independent inspection agencies in a timely manner, allowing Engineer/Architect adequate time for review and approval.
B. Special Structural Testing Schedule to be implemented per specifications.
C. When changes to construction schedule are necessary during construction, the Contractor shall coordinate such changes of schedule with the testing laboratory as required.
D. When the testing laboratory is ready to test according to the established schedule but is prevented from testing or taking specimens due to incompleteness of the Work, all extra charges for testing attributable to the delay may be back charged to the Contractor and shall not be borne by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 ACCEPTABLE TESTING AGENCIES

A. Recognized and/or licensed firms qualified to conduct the required testing.

3.02 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
2. Comply with the Contract Document requirements for Division 01 Section 01 73 29 "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.
C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection facilities.

B. Temporary utilities include, but are not limited to, the following:

1. Sewers and drainage.
2. Water service and distribution.
3. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities.
4. Heating, ventilation and cooling facilities including humidification or dehumidification.
5. Electric power service.
6. Lighting.
7. Internet service.

C. Support facilities include, but are not limited to, the following:

1. Project identification and temporary signs.
2. Waste disposal facilities.
3. Field offices.
4. Storage and fabrication sheds.
5. Lifts and hoists.
6. Construction aids and miscellaneous services and facilities.
7. Dewatering facilities and drains.
8. Snow removal of construction site.
9. Weed trimming and grass cutting of construction site.

D. Security and protection facilities include, but are not limited to, the following:

1. Environmental protection.
2. Stormwater control.
3. Tree and plant protection.
4. Pest control.
5. Site enclosure fence.
6. Security enclosure and lockup.
7. Barricades, warning signs, and lights.

8. Temporary enclosures.
9. Temporary partitions.
10. Fire protection.
11. Site security lighting.

E. Related Sections include the following:

1. Section 00 73 19, “Safety.”
2. Section 01 11 00 "Summary of Work" for use of Project premises, limits of use, and limitations on utility interruptions.
3. Section 01 12 00 "Multiple Work Scope Summary".
4. Section 01 33 00 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
5. Section 01 73 00 "Execution" for progress cleaning requirements.
6. Divisions 23 through 28 for temporary heat, ventilation, and humidity requirements for products in those Sections.
7. Division 32 Sections for construction and maintenance of asphalt paving and cement concrete pavement for temporary roads and paved areas.

1.03 DEFINITIONS

A. Permanent Enclosure: As determined by Architect and Construction Manager, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.04 DIVISION OF RESPONSIBILITIES

A. Assignment Control: Contractor assignments in Parts 2 and 3 are stated at the point of requirement for convenience and shall be consistent with this Article. If assignments appear to conflict, the more specific assignment governs.

B. General: The Site and Athletic Improvements Contractor is responsible for temporary facilities, controls, protection, maintenance, and restoration associated with site work and exterior areas outside the building enclosure. The Contractor for General Construction is responsible for temporary facilities, controls, protection, maintenance, and restoration associated with the buildings, including work within and directly serving the building enclosure. Responsibilities expressly assigned to another Prime Contractor govern over this general division. All Contractors shall review this Section for requirements applicable to their Contracts.

C. Each Prime Contractor is responsible for:

1. Installation, operation, maintenance, and removal of temporary services and facilities customarily associated with its own Work, including associated costs except as otherwise specified.
2. Plug-in power cords, extension cords, supplementary task lighting, and special lighting required exclusively for its own Work.

3. Its own field office or job trailer, including furniture, electrical distribution, internet service, and any toilet or wash facilities integral to that trailer. Project-wide sanitary facilities are provided by the Site and Athletic Improvements Contractor.
4. Its own storage and fabrication sheds.
5. Supplemental heating, ventilation, humidity control, or enclosure required exclusively for its own Work and not included in the project-wide temporary systems assigned elsewhere in this Section.
6. Supplemental temporary heat required above the specified 60-degree-F minimum exclusively for its own Work.
7. Hoisting required for its own Work, including loads exceeding 2 tons, materials or equipment placed below grade, and hoisting outside the building enclosure, unless specifically assigned otherwise.
8. Collection and lawful disposal of hazardous, dangerous, unsanitary, or otherwise harmful waste generated by its own Work.
9. Secure storage of its own tools, materials, and equipment.
10. Construction aids and miscellaneous services required exclusively for its own Work.
11. Collection and lawful disposal of fluid waste generated by its own Work until the permanent sewer system is operational and permitted to receive such discharge.
12. Separation and lawful disposal of solids before discharge to the permanent sewer system.
13. Regular cleanup of its own Work areas and placement of construction debris in designated containers. Refer to Article 3.04.D, Waste Disposal Facilities and Cleanup.
14. Coordination and lawful disposal of waste generated by demolition included in its Contract. Coordinate container locations with the Construction Manager and the Phasing Plan(s) before placement. If a Prime Contractor fails to maintain required cleanup, the Construction Manager may assign the work to others and charge the responsible Prime Contractor.
15. Dewatering and drainage for each Prime Contractor's individual scope. Specific assignments below govern over this general requirement.

D. The Contractor for General Construction is responsible for:

1. Building-related temporary facilities and controls not expressly assigned to the Plumbing/Fire Protection, HVAC, or Electrical Contractors.
2. Temporary enclosure of the buildings.
3. Temporary partitions within the buildings.
4. Temporary fire protection and fire extinguishers within the buildings, excluding temporary fire hoses assigned to the Plumbing/Fire Protection Contractor.
5. Temporary HVAC and humidity control for active building construction areas from Notice to Proceed until the permanent HVAC systems are complete and operational in accordance with the Project Milestone Schedule.
6. Rodent and pest control within the buildings.
7. Barricades, warning signs, and lights within and immediately serving the buildings.
8. Security enclosure and lockup for the buildings.
9. Coordination of fire-watch activities within the buildings; each responsible entity shall provide fire-watch services required by its Work.
10. Protection of existing building finishes and elements to remain.

E. The Plumbing/Fire Protection Contractor is responsible for:

1. Temporary sewers and stormwater drainage within the building footprint and extending 5 feet beyond the building footprint, except temporary roof drainage specified below.
2. Temporary fire hoses and signs as required.
3. Temporary roof drainage as specified in Article 3.04.C.2.

F. The Heating, Ventilating and Air-Conditioning (HVAC) Contractor is responsible for:

1. Permanent heating, ventilation and air conditioning (HVAC) from when permanent HVAC Systems are to be complete and functioning in accordance with the Project Milestone Schedule for each area until after Owner occupancy, including any necessary temporary utility service and connections.
2. All labor, materials, equipment, controls, testing, balancing, and commissioning activities necessary to maintain fully operational HVAC service in occupied building areas during all phases of construction.

G. The Electrical Contractor is responsible for:

1. Temporary electric power service and distribution, and temporary service requirements as required with the Construction Manager and the Energy Company. Two temporary power locations (home and visitors side) achieved by rerouting existing power which is scheduled to be removed.
2. Temporary lighting for building and site.
3. Electrical connections to existing systems and temporary facilities and controls furnished by the General Construction Contract, Plumbing Contract, Mechanical Contract and Electrical Contract.

H. The Site and Athletic Improvements Contractor is responsible for:

1. Erosion and sedimentation controls, stormwater controls, and other environmental protection measures for site work and exterior areas.
2. Temporary water required for site work until the permanent water service is available as specified.
3. Fire Extinguishers for exterior locations outside of building footprints.
4. Project-wide temporary toilets and wash facilities, dumpsters, and site perimeter fencing and gates.
5. Security enclosure, lockup, barricades, warning signs, and traffic controls for site and exterior areas, coordinated with the General Contractor at building interfaces.
6. Site drainage, dewatering, snow and ice removal, and maintenance of exterior construction areas, except work expressly assigned to another Prime Contractor.
7. Project identification signs and exterior directional and traffic-control signs as directed by the Construction Manager.
8. One construction trailer for the Site and Athletic Improvements Contractor, with access for weekly project meetings and a conference room accommodating 10 to 15 people.

1.05 USE CHARGES AND OUTLINE REQUIREMENTS

A. General: Cost or use charges for required temporary facilities shall be included in the total Contract Sum are not chargeable to Owner, Construction Manager, or Architect as extra costs. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:

1. Owner's construction forces.
2. Occupants of Project.
3. Architect and Construction Manager (CM).
4. Testing agencies.
5. Personnel of authorities having jurisdiction.

B. Water Service: Site and Athletic Improvements Contractor shall be responsible for all water needs on project, from a water truck, temporary service as shown on the Phasing Drawings, or from new water service, from Notice to Proceed and until new permanent water service is installed and metered to building site. Owner will pay for metered use charges for the Project once the permanent system is installed, tested and accepted by Water Authority.

C. Sewer Service: Each individual Contractor shall be responsible for collecting and disposing of any water containing solids or other effluents with or without solids that are to be disposed of as a function of their work until the permanent septic or sewer system is fully functional and operational. Any effluents not permitted to be discharged into sewer or septic system shall be collected and disposed of by each Contractor responsible for generating the discharge.

D. Electric Service: Electrical Contractor shall furnish and install temporary power service for construction activities. Owner shall pay for all metered use charges from temporary service. Once permanent service is active, Owner will pay for use charges for permanent service.

E. HVAC System:

1. General Contractor shall provide temporary HVAC systems and pay for all HVAC costs for all active construction areas from Notice to Proceed until permanent HVAC Systems are complete and functioning in accordance with the Project Milestone Schedule.
2. HVAC Contractor is responsible for providing and operating the permanent HVAC system no later than the date listed in the Project Milestone Schedule for permanent HVAC Systems to be complete and functioning. Utility costs for permanent HVAC system use will be paid by Owner.
3. HVAC Contractor is responsible to protect any existing HVAC systems indicated to remain.
4. General Contractor is responsible to provide any supplemental HVAC equipment, including humidification and/or dehumidification equipment, that is necessary for the installation of new construction and finishes and maintaining equipment in place until Substantial Completion.
5. Owner will not be responsible for any costs for servicing, maintaining or operating temporary or permanent systems until after Substantial Completion of each phase except metered utility charges specified in Article 3.03.G.7.

6. HVAC Contractor must maintain, operate and extend equipment warranties as required to provide the Owner with a new, clean system with all warranty periods in effect as required by the Contract Documents.
7. HVAC Contractor shall provide a filter change in compliance with manufacturer requirements after the date of Substantial Completion.
8. HVAC Contractor shall comply with all the requirements of Article 3.3.G.
9. HVAC Contractor shall provide all necessary controls for safety requirements including smoke or fire monitoring, and with all necessary shutdown features to run and operate temporary or permanent HVAC systems in accordance with the Project Milestone Dates for turnover of temporary/permanent HVAC systems.

F. Clarification of Utility Use Charges:

1. The Owner will pay for utility company metered electrical usage for construction activities and for one job trailer for each prime contractor.
2. Each Prime Contractor shall pay for their communication usage.

1.06 SUBMITTALS

A. Implementation and Termination Schedule: Within 15 days of date established for commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
C. Temporary Utility Reports: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

1.07 QUALITY ASSURANCE

A. Standards: Comply with ANSI A10.6, NECA's "Temporary Electrical Facilities," and NFPA 241.

1. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with trade regulations and union jurisdictions.
2. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.08 PROJECT CONDITIONS AND OPERATION

A. Temporary Utilities: At earliest feasible time, when acceptable to Owner, change over from use of temporary service to use of permanent service.

1. Temporary Use of Permanent Facilities: Installer of each permanent system and service shall assume responsibility for operation, maintenance, and protection of each permanent system and service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:

1. Keep temporary services and facilities clean and neat.
2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Undamaged, previously used materials in serviceable condition may be used if approved by Construction Manager. Provide materials suitable for use intended.
B. Portable Chain-Link Fencing: The Site and Athletics Contractor shall provide temporary, post-driven galvanized steel chain link fence, 6'-0" high, 11-gauge wire in a 2" (50-mm) mesh with top and bottom selvages knuckled with movable supported ballast systems. At select locations where approved by CM, provide driven posts.
C. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.
D. Water: Potable.
E. Pavement and Concrete: Comply with requirements of Division 03 and 32 Sections.
F. Lumber and Plywood: Comply with requirements of Division 06 Section "Rough Carpentry".
G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indices of 25 and 50, respectively.
H. Paint: Comply with requirements in Division 09 Section "Painting".

2.02 TEMPORARY FACILITIES

A. General: Provide equipment suitable for use intended.
B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

2.03 EQUIPMENT

A. Fire Extinguishers: Hand carried, portable, UL rated. Provide class and extinguishing agent as indicated or a combination of extinguishers of NFPA-recommended classes for exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
2. Extinguisher shall have a valid inspection tag.

C. Temporary HVAC Equipment: Unless Owner authorizes use of permanent heating system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
3. Temporary Dehumidifying Equipment: Provide system engineered by temporary equipment supplier for expected conditions and interior environment requirements specified. Provide self-contained, recirculating refrigeration units with water collection and filtration capabilities.

    a. Equipment shall be sized with sufficient moisture extraction capabilities to maintain ambient interior air within specified relative humidity range.
    b. Provide collection and/or drainage capabilities to prevent condensate from re-evaporating in conditioned space or from spilling on floors.

D. Generators: Provide generators sized to power equipment where temporary electric service is of insufficient capacity.
E. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
F. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.
G. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.01 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials.

3.02 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.03 TEMPORARY UTILITY INSTALLATION AND REQUIREMENTS

A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Before temporary utility is available, provide trucked-in services.
3. Obtain easements to bring temporary utilities to Project site where Owner's easements cannot be used for that purpose.

B. Sewers and Drainage — Site and Athletic Improvements Contractor: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. If neither sewers nor drainage facilities can be lawfully used, provide containers and lawfully dispose of effluent off-site.

1. Filter out excessive soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
2. Connect temporary sewers to municipal system as directed by sewer department officials.
3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. After heavy use, restore normal conditions promptly.
4. Provide temporary filter beds, settlement tanks, separators, and similar devices to purify effluent to levels acceptable to authorities having jurisdiction.
5. Site and Athletic Improvements Contractor will coordinate and connect to Plumbing Contractor’s temporary piping at a point 5 feet beyond the building footprint.

C. Water Service — Site and Athletic Improvements Contractor until permanent service is available; Plumbing Contractor thereafter:

1. General: Install water service and distribution piping in sizes and pressures adequate for construction.
2. Site and Athletic Improvements Contractor is responsible for all water needs on Project using water trucks until new water service is available at the building.
3. After new water service is available at the building, Plumbing Contractor shall provide the following:

a. Water Service: Use of Owner's new water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to like-new condition.
b. Provide rubber hoses as necessary to serve Project site.
c. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
d. Provide a minimum of 30-psi (200-kPa) static pressure at highest point.

D. Sanitary Facilities — Site and Athletic Improvements Contractor: Provide project-wide temporary toilets and hand-wash facilities complying with applicable regulations and health codes.

1. Disposable Supplies: Site and Athletic Improvements Contractor to provide toilet tissue, paper towels, hand sanitizer, and similar disposable materials including covered waste containers for disposal of used material.
2. Toilets: Use of Owner's existing toilet facilities will not be permitted. Contractors shall use Site and Athletic Improvements Contractor-provided self-contained toilet units..
3. Wash Facilities: Site and Athletic Improvements Contractor to provide wash facilities supplied with potable water at convenient locations for personnel.
4. Contactors shall provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

E. Chain-Link Fence — Site and Athletic Improvements Contractor:

1. The Site and Athletic Improvements Contractor shall secure the site and furnish gates as shown on Phasing Plan(s) or as required for project and directed by Construction Manager. The fencing and gates shall be relocated and adjusted during the Project as required, as noted on the Phasing Plans(s) and/or as directed by Construction Manager.

F. Temporary HVAC and Humidity Control — General Contractor: Provide temporary HVAC and humidity control for active building construction areas until permanent HVAC systems are complete and operational in accordance with the Project Milestone Schedule. Comply with the following:

1. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.
2. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
3. Maintain the temporary heat to a minimum of 60 degrees F.
4. The General Contractor shall provide all other Prime Contractors with the Project Schedule and the minimum heating requirements to protect the Work as scheduled. If through no fault of any other Prime Contractor, the General Contractor does not maintain the original approved schedule, the General Contractor shall continue to provide temporary heat and humidity control to other Prime Contractors when required.

5. The General Contractor shall not be responsible for providing temporary heat and humidity control in permanently unconditioned areas or in areas not scheduled for work, unless the approved construction schedule is modified and accepted by the Owner and all Prime Contractors.
6. Prime Contractors are responsible for protecting their work in unconditioned or unscheduled work areas at no additional expense to the Owner.
7. Prior to the permanent heating system being operational, and when necessary for the proper prosecution of the work, the General Contractor shall provide, maintain, operate and pay all costs including fuel, for sufficient approved heat.

G. Existing and Permanent HVAC Systems: Comply with the following:

1. The General Contractor shall provide, maintain and operate sufficient temporary heating/cooling.
2. If the new permanent heating or cooling system is used during the construction period, the HVAC contractor shall be responsible to professionally clean all HVAC systems prior to turnover of the building to the Owner.
3. The HVAC Contractor shall properly protect all existing / permanent HVAC equipment / systems from construction air dust and debris beginning from initial installation.
4. Select safe equipment that will not have a harmful effect on completed installations or elements being installed.
5. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
6. Maintain the temporary heat to a minimum of 60 degrees F for construction areas and at 70 degrees F for all occupied areas.
7. The Owner is not responsible for temporary-HVAC equipment, non-electric fuel, operation, servicing, or maintenance costs. The Owner shall pay metered electrical charges as specified in Article 1.05.F.1. 8.
8. Portable heaters will not be acceptable during final finishing operations.
9. The existing or new heating and exhaust system or any portion thereof may NOT be used by the General Contractor to provide temporary heat and exhaust.
10. The HVAC Contractor shall be permitted to use the permanent HVAC system when it is complete and functioning in accordance with the Project Milestone Schedule and as required for the proper prosecution of the work as long as all the necessary protection and cleanup required by the Specifications and recommended by the manufacturer are strictly followed, and only when outside air is supplied directly to the burners. The HVAC Contractor shall, when operating the permanent system complete all required servicing and adjusting to maintain the system in proper running order to prevent damage to the building or its equipment during the construction period. Units placed in permanent operation must be fully controlled using the final control system operational sequence.
11. When the HVAC Contractor performs startup and begins using the permanent HVAC systems, the Contractor must provide pre-filters, return air filters, plenum filters and or other modifications to the systems necessary to prevent dirt, dust and other contaminants from entering the system. If measures implemented do not prevent dust from entering the systems, the HVAC Contractor shall perform cleaning of duct, coil and other HVAC components necessary to provide clean HVAC systems at Substantial Completion of the Project.

12. Prior to turning over the new permanent heating and ventilating system to the Owner, the HVAC Contractor shall thoroughly clean the system, provide new filters, make re-adjustments as required and bear all cost to place the system in first-class operating condition. Contractor shall follow all recommended requirements for cleaning and media as provided in compliance with manufacturer recommendations,
13. The warranty period of individual pieces of equipment of the permanent system used during the construction period shall be extended during the temporary use period and the starting date used for determination of expiration for such warranties shall begin upon final acceptance of the project by the Owner.
14. Work which is damaged as a result of improper or insufficient climate control shall be removed and replaced.

H. Ventilation and Humidity Control by General Contractor:

1. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment from that specified that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
2. Temporary Humidity Control:
    a. General: Where control of ambient humidity is required for proper performance of the work, or for curing/drying of installed work, or for protection of installed work from deterioration due to variations in ambient conditions and/or adverse effects of high humidity, the General Contractor shall provide temporary humidification or dehumidification equipment to maintain the required conditions. This equipment may require air conditioning to achieve the desired results and maintain the Project schedule. Determination of the required equipment is the responsibility of the General Contractor. Coordinate the use of the equipment with temporary heating to produce the required conditions with a minimum overall use of energy.
    b. Construction Dehumidification (ongoing): The General Contractor shall provide portable dehumidification units for use during construction. Units shall be provided as required to maintain optimal building moisture conditions required for the proper performance of the Work. Moisture levels shall be maintained throughout both occupied and unoccupied areas of the facilities.
    c. Units shall be refrigeration-based and shall include standard 115V power cord, humidistat, integral condensate pump, wheels and handle. Units shall be as manufactured by Ebac or approved equal. Dehumidifier capacities and quantities shall be as follows:
        1) Quantity is based on need to meet humidity levels required by the manufacturer.
        2) Locations shall be as agreed upon in the field with the Architect and Construction Manager.

d. General Contractor shall furnish and install drainage hoses and connections to discharge condensate to exterior of building at locations acceptable to the Construction Manager and Architect.
e. The Electrical Contractor shall be responsible to distribute power sources throughout each area of the building dedicated for the purpose of power for the humidification and/or dehumidification units. This power shall be in addition to power required by the trades for performance of their Work.

G. Electric Power Service — Electrical Contractor: Provide weatherproof, grounded electric power service and distribution of sufficient size, capacity, and characteristics for construction. Include meters, transformers, overload-protected disconnects, and automatic ground-fault interrupters.

1. Install power distribution wiring overhead or underground and rise vertically where least exposed to damage.
2. Electric power service including all necessary poles and accessories shall be extended from off-site available sources after coordination with local electric utility company.
3. Provide or extend the following temporary construction electric services to the various building areas within twenty (20) days of Notice to Proceed unless noted otherwise:

a. 120/208-volt, three phase, four-wire wye with a solid neutral service.
b. Transformation and power distribution as shown as required for temporary needs specified unless noted otherwise on Construction Documents.
c. Power receptacles distributed across the building as the Project develops. Minimum requirements for the building are as follows:

1) Twenty-five (25) 120-volt receptacles
2) Ten (10) 240-volt receptacles

d. Temporary power for construction area.
e. Ten (10) temporary connections to HVAC temporary heating units when directed by CM.
f. Ten (10) site lights when directed by CM

4. All extensions from the temporary power receptacles shall be provided by the parties requiring power.

J. Electric Power Service: Use of Owner's new electric power service will be permitted, as long as equipment is maintained in a condition acceptable to Owner.
H. Electric Distribution — Electrical Contractor: Provide receptacle outlets adequate for power tools and equipment in new and existing building areas.

1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
2. Provide warning signs at power outlets other than 110 to 120 V.
3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.

4. Provide metal conduit enclosures or boxes for wiring devices.
5. Provide 4-gang outlets, spaced so 100-foot (30-m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
6. At earliest feasible time, but no later than 60 days prior to Substantial Completion of each Phase, provide permanent electric distribution systems.

I. Temporary Lighting — Electrical Contractor: Provide and maintain temporary lighting with local switching adequate for construction operations and traffic conditions. Provide temporary lighting wherever overhead floor or roof deck has been installed.

1. For new construction and existing buildings where all systems are removed:

a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
b. Provide LED temporary lighting. Unless noted otherwise, each “lamp” shall be a minimum of 1600 lumens, either screw-in type or native LED type Where higher lumens are specified, lighting shall be native LED, not screw-in type. Lamps shall be uniformly distributed in all areas requiring temporary lighting to meet the minimum illumination intensity noted for the area or operation as outlined by the Occupational Safety and Health Administration (OSHA) standard for minimum illumination requirements at construction sites (OSHA 29 CFR 1926.56).

2. At earliest feasible time, but no later than 60 days prior to Substantial Completion of each Phase, provide permanent lighting systems both inside the building and on the site for use in completing construction and lighting the project site. Contractor must operate, maintain and protect the permanent systems through final completion of the project and provide full project warranty from the contract completion date of the project.

3.04 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines in accordance with ASTM E136. Comply with NFPA 241.
3. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will not be permitted to use permanent facilities.

B. Temporary Roads and Paved Areas — Site and Athletic Improvements Contractor: Construct and maintain temporary roads and paved areas adequate for construction loads and traffic. Locate them in accordance with the Phasing Plan(s) and extend them as required for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 20 00 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proof rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section “Hot-Mix Asphalt Paving”.
5. Provide dust-control treatment that is non-polluting and non-tracking. Re-apply treatment as required to minimize dust.
6. Cooperate with Work by others on the adjoining property construction.

C. Dewatering Facilities and Drains — Assigned Contractors: Provide temporary drainage and dewatering in accordance with Article 1.04 and applicable Division 31 Sections. Maintain the Project site, excavations, and construction areas free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining property nor endanger permanent Work or temporary facilities.
2. Plumbing Contractor to provide temporary roof-drainage piping after roofing or waterproof deck construction is complete and until the permanent storm-drainage system is connected and operational.
3. Prime Contractor installing drains and any pipes for storm or sanitary systems shall verify that all systems are clear of debris prior to Substantial Completion. If necessary, flush all systems.
4. Remove snow and ice as required to minimize accumulations is by Site and Athletic Improvements Contractor.
5. Each Prime Contractor shall remove water from trenches, excavations, and other areas associated with its Work.

D. Waste Disposal Facilities and Cleanup — Site and Athletic Improvements Contractor for shared dumpsters, container positioning, hauling, and disposal fees; each Prime Contractor for collection, sorting, internal transport, and cleanup of waste generated by its Work.

1. Site and Athletic Improvements Contractor shall:
    a. Provide dumpsters, hauling, and pay disposal fees excluding hazardous, regulated, liquid, and prohibited waste generated by individual Prime Contractors.
    b. Provide equipment and labor required for positioning and relocating waste containers on site as well as compacting or consolidating materials in the containers.
    c. Prime Contractors may not place prohibited materials or overfill containers and remain responsible for correcting improper disposal.

E. Field Offices — Each Prime Contractor:

1. Locate facility where it will serve the project adequately and result in minimum interference with the performance of the work.
2. Relocate and modify facilities as required. Furnish facility prior to start of work and remove facility at final completion of project.
3. Provide all utilities to service facility, including electric service, lighting, and other facilities as required.

F. Traffic Controls — Site and Athletic Improvements Contractor: Provide temporary traffic controls, warning signs, STOP signs, and directional signage for public and construction traffic. Comply with authorities having jurisdiction and coordinate with the Construction Manager and Owner.

1. Protect existing site improvements to remain, including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

G. Project Identification and Temporary Signs — Site and Athletic Improvements Contractor:

1. Prepare and install one 4’ x 8’ Project identification sign as indicated on the drawings or directed by Construction Manager and Architect. Do not permit installation of unauthorized signs.
2. Prepare and install up to 18 signs 4’ x 3’ with information to direct and control traffic on site and in building. Apply graphics and text as directed by Construction Manager. Install where directed.
3. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details provided by the Architect.
4. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
5. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer. Architect will provide digital file for graphic. Adhere custom vinyl graphic after paint has cured. Edge seal vinyl graphic using a fine-tip brush, painting the edges of the film with a commercial grade edge sealer.

3.05 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection — Site and Athletic Improvements Contractor for site and exterior impacts; General Contractor for building-related dust and noise: Provide protection and conduct construction in compliance with environmental regulations while minimizing air, waterway, soil, dust, and noise impacts.
B. Stormwater Control — Site and Athletic Improvements Contractor: Provide silt barriers and other controls sufficient to prevent flooding and sediment migration from runoff.
C. Tree and Plant Protection — Site and Athletic Improvements Contractor: Install temporary protection outside tree drip lines and protect vegetation and root systems from damage, flooding, and erosion.

D. Site Enclosure Fence — Site and Athletic Improvements Contractor: Before construction begins, install chain-link fencing with lockable gates around the required site limits.

1. Set fence posts below grade a minimum of 3 feet.
2. Provide gate in sizes and at locations necessary to accommodate delivery vehicles and other construction operations.
3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide CM and Owner with one set of keys and/or access code(s).
4. Provide plywood on fencing adjacent to existing windows and doors.

E. Building Security Enclosure and Lockup — General Contractor: Provide substantial temporary enclosures and lockable entrances at incomplete building openings to prevent unauthorized access, vandalism, and theft.

F. Daily Security — Site and Athletic Improvements Contractor for site gates and exterior access; General Contractor for building windows, doors, and access points: Secure assigned areas at the end of each workday.

G. Barricades, Warning Signs, and Lights — Site and Athletic Improvements Contractor for site and exterior areas; General Contractor for building areas: Provide code-compliant barricades, signs, and warning lights appropriate to each hazard.

1. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch-thick exterior plywood.
2. Where indicated on phasing plan provide concrete ‘Jersey’ barriers.

H. Temporary Building Enclosures — General Contractor: Provide temporary weather-resistant enclosures to protect work in progress and completed construction.

1. Where heating or cooling is needed and permanent enclosure is not complete, provide insulated temporary enclosures. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
2. Vertical Openings: Close openings of 25 sq. ft. or less with plywood or similar materials.
3. Horizontal Openings: Close openings in floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
4. Install tarpaulins securely using fire-retardant-treated wood framing and other materials.
5. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use fire-retardant-treated material for framing and main sheathing.
6. Provide temporary enclosures as required to meet criteria for permanent enclosure no later than the beginning of any of the following Work:
    a. Spray fireproofing.
    b. Interior finishes, including gypsum wallboard finishing, painting and wall coverings.
    c. Architectural woodwork.
    d. Institutional casework.
    e. Install temporary enclosures before time frames stated above when necessary to maintain interior relative humidity levels and temperatures as required to promote drying of concrete and concrete masonry substrates so

that they achieve low enough moisture content and vapor emission levels to permit timely installation of finishes.

I. Temporary Building Partitions — General Contractor: Provide sealed, dust-resistant partitions and temporary enclosures to limit migration of dust, fumes, and noise and to separate construction from occupied or protected areas.

1. Construction dustproof partitions of not less than nominal 4-inch studs, 5/8-inch gypsum wallboard with joints taped on occupied side, and 1/2-inch fire retardant plywood on construction side.
2. Construct dustproof, floor-to-ceiling partitions of not less than nominal 4-inch studs, 2 layers of 3-mil polyethylene sheets, inside and outside temporary enclosure. Cover floor with 2 layers of 3-mil polyethylene sheets, extending sheets 18 inches up the side walls. Overlap and tape full length of joints. Cover floor with 3/4-inch fire-retardant plywood.
3. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
4. Protect air-handling equipment.
5. Weatherstrip openings.

J. Exterior Building-Surface Protection — General Contractor:

1. Where sequence of operations exposes exterior finished materials including, but not limited to factory finished metal, anodized metal, glass and the like, to mortars, grouts, alkalis, acids, strong detergents or other materials that may cause damage to adjacent finishes, provide surface protection materials completely over surface to be protected.
2. Comply with surface protection material manufacturer’s recommendations. Do not leave materials in place beyond maximum time limit.
3. Remove protection materials completely when at-risk work is complete.

K. Traffic-Surface Protection — Site and Athletic Improvements Contractor for exterior surfaces; General Contractor for building surfaces:

1. New Finished Traffic Surfaces: From the time of installation to just before inspection for Substantial Completion, overlay traffic surfaces with traffic protection products as recommended by manufacturer for substrates to be protected. Replace traffic protection products when damaged. Where specified products do not meet construction traffic demands or when required by Architect or Construction Manager, provide more substantial protection as specified below for existing traffic surfaces to remain.
2. Existing Finished Traffic Surfaces to Remain: From the time of one week before the commencement of any work of a phase of any prime contractor in area or areas immediately adjacent to floors to be protected, overlay traffic surfaces with one layer of craft paper and follow with one layer of plywood. Secure plywood with heavy adhesive tape. Maintain protection for duration of work in area and remove just before inspection for Substantial Completion.

L. Temporary Fire Protection — General Contractor for fire extinguishers and coordination; Plumbing/Fire Protection Contractor for temporary standpipes and hoses: Provide and

maintain temporary fire-protection facilities until permanent facilities are operational. Comply with NFPA 241.

1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
2. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
3. Provide temporary standpipes and hoses for fire protection of sufficient length to reach construction areas. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
5. Coordinate activities with Fire Watch. Notify Fire Watch of hours of operation and planned fire-risk activities such as welding within construction areas.

M. Fire Watch — Entity assigned in Section 01 12 00; coordinated by the General Contractor within the buildings: Provide trained fire-watch personnel in accordance with applicable standards and the following requirements:

1. Fire Watch personnel shall be trained and provide services in compliance with NFPA 601 “Standard for Security Services in Fire Loss Prevention” and shall be acceptable to the Authorities Having Jurisdiction.
2. The responsible party for Fire Watch Services as defined in Division 01 Section “Multiple Work Scope Summary” shall be considered “Management” for the purposes of complying with the referenced standards.
3. Fire Watch personnel shall be provided with portable communications to permit immediate communication with school authorities, contractors and public emergency services.
4. Conduct a coordination meeting in advance of the earliest requirement for Fire Watch with the Owner, respective Project Coordinators, Construction Manager, Authorities Having Jurisdiction and Architect.
    a. Develop an emergency response plan for risks associated with construction. Coordinate with Owner’s existing security and emergency response plan.
    b. Establish the lines of and order of communications based on each anticipated risk type.
    c. Project Coordinators shall record and transmit minutes of the meeting to attendees and to Fire Watch personnel.
5. Fire Watch shall be provided at the Work by respective responsible entity as defined in Division 01 Section “Multiple Work Scope Summary.”
    a. When hot work is being conducted.
    b. When fire alarm is not in operation in occupied areas for time greater than 4 hours.
    c. When fire suppression system is not in operation in occupied areas for time greater than 4 hours.

6. For the entire duration of time from the disturbance of the egress route.

N. Fire Extinguishers — General Contractor within buildings; Site and Athletic Improvements Contractor in site and exterior areas: Provide Class A stored-pressure water extinguishers or Class ABC dry-chemical extinguishers appropriate to the exposure.

1. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking/vaping on the Project site and within all building areas.
4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

O. Permanent Fire Protection — Plumbing/Fire Protection and Electrical Contractors, as applicable: Complete connected permanent fire-suppression and fire-alarm systems at the earliest feasible date, place them in operation, and instruct designated personnel in their use.

3.06 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
2. Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
D. Temporary Facility Changeover for Security and Protection: Except for using permanent fire protection as soon as available, do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
E. Termination, Removal and Temporary Facility Changeover: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns and dispose of in a legal manner. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements in Section 017700 "Closeout Procedures."
4. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
5. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

3.07 NO SMOKING

A. Smoking or vaping is not permitted on the entire Project site.

3.08 IDENTIFICATION OR SIGNS

A. Only one project sign will be permitted for the site, provided by the Site and Athletic Improvements Contractor and listing all contractors. Individual contractor signs, other advertisements, or flags will not be permitted.

3.09 COMPLIANCE WITH TEMPORARY FACILITIES AND CONTROLS

A. If contractor does not comply with any of the requirements of this Section, CM reserves the right to recommend to Owner to withhold adequate funds from payment applications to pay for completing the Work as required.

END OF SECTION 01 50 00

SECTION 01 60 00 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for selecting products for use in the Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
B. See Division 01 Section "Closeout Procedures" for submitting warranties for contract closeout.
C. See Divisions 02 through 33 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.03 DEFINITIONS

A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

    1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation, shown or listed in manufacturer's published product literature, which is current as of date of the Contract Documents.
    2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
    3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other

characteristics for purposes of evaluating comparable products of other named manufacturers.

D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.04 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
2. Form: Tabulate information for each product under the following column headings:
    a. Specification Section number and title.
    b. Generic name used in the Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.
    g. Projected delivery date or time span of delivery period.
    h. Identification of items that require early submittal approval for scheduled delivery date.
3. Initial Submittal: Within 30 days after date of commencement of the Work, submit (1) copy of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
    a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
4. Completed List: Within 60 days after date of commencement of the Work, submit (1) copy of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.
5. Architect/Engineer and/or Construction Manager Action: If necessary, Architect/Engineer and/or Construction Manager will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect/Engineer and/or Construction Manager will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later. Architect's response, or lack of response, does not constitute a waiver of requirement that products comply with the Contract Documents.

B. Pre-bid Substitution Requests: Submit one copy of each Pre-bid Substitution Request not later than 10 days prior to receipt of Bids for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Refer to Specification Section 00 43 25, Substitution Request Form.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified material or product cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. List of similar installations for completed projects with project names and addresses and names and addresses of Architects and owners.
    g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    j. Cost information, including a proposal of change, if any, in the Contract Sum.
    k. Bidder’s certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

    a. Form of Acceptance: Addendum.
    b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated from the information provided it will be rejected.

C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.05 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project; product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. Each Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect and Owner will determine which products shall be used.
3. The material selected by the Architect shall be provided at no additional cost to the Owner.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions. Deliveries addressed to the project, in general, the Owner, Architect/Engineer, or Construction Manager, will be refused and returned to shipper.

1. Notify Construction Manager and Owner 48 hours in advance of major deliveries.
2. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
3. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
4. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
5. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
6. Store products to allow for inspection and measurement of quantity or counting of units.
7. Store materials in a manner that will not endanger Project structure.
8. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
9. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
10. Protect stored products from damage.

1.07 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
3. Refer to Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.01 PRODUCT OPTIONS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Project Engineer will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is provided by Architect/Engineer and/or Program Manager.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures: Procedures for product selection include the following:

1. Product: Where Specification paragraphs or subparagraphs titled "Product" name a single product and manufacturer, provide the product named.
2. Manufacturer/Source: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a

product by the manufacturer or from the source named that complies with requirements.

3. Products: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
7. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer. Comply with provisions in "Product Substitutions" Article.
8. Basis-of-Design Products: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product(s)" are included and also introduce or refer to a list of manufacturers' names, provide either the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Project Engineer's sample. Project Engineer's decision will be final on whether a proposed product matches satisfactorily.
    a. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect and Owner will select color, pattern, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect and Owner will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

2.02 COLOR SELECTION

A. Pre-Selected Colors:

1. Where colors have been specifically identified in the Contract Documents, the products provided by the Contractor shall match the selected color to the satisfaction of the Architect or the product will be rejected as non-conforming materials.
2. Manufacturers listed in the specification sections are capable of manufacturing the product specified but may not manufacture the specific selected color identified in the Contract Documents as part of their running line.

B. If additional up-charges are associated with providing the colors identified in the Contract Documents, the Contractor shall be responsible for all such costs and no additional cost to the Owner above the Contract Sum will be considered.

C. Colors Selected During Construction:

1. Products will be selected by the Architect from the standard colors of any of the listed or approved manufacturers, unless a specific color or color price range has been identified prior to bidding.

D. Location of Selected Colors: In general, preselected colors are identified in the following locations:

1. Exposed Interior Finishes: Room Finish Schedule - Color Legend.
2. Other Materials: Individual Specification Sections or notes to the Drawings.

2.03 SUBSTITUTIONS AFTER EXECUTION OF THE AGREEMENT

A. Substitution of Materials: No substitutions of materials will be considered after the Execution of the Contract without a Credit to the Owner unless a Product becomes unavailable through no fault of the Contractor.

B. NO ACTION TO REVIEW THE PROPOSED SUBSTITUTION WILL BE TAKEN BY THE ARCHITECT OR ENGINEER UNTIL THE CONTRACTOR HAS SUBMITTED THE FOLLOWING:

1. A letter itemizing the proposed credit to Owner.
2. A copy of the warranty.
3. A summary of the schedule impact.
4. Properly executed Document 00 43 25, Substitution Request Form.

C. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request as included above, or when acceptance will require revision to the Contract Documents.

D. In submitting a substitution request the Contractor acknowledges that:

1. The Contractor shall coordinate installation of the substitution including modifications to other Work.

2. The use of this Substitution will not adversely affect the Project Schedule.
3. If modifications to the work of this contract or another contract are required because of the substitution these modifications shall be made at no additional cost to Owner.
4. The Contractor waives all rights to claims for additional costs or time extension which may subsequently become apparent.

2.04 COMPARABLE PRODUCTS

A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:

1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of Project Engineers and owners, if requested.
5. Samples, if requested.

2.05 USE OF NON-HAZARDOUS MATERIALS:

A. Materials used in this Project shall have no detectable levels of the following hazardous materials.

1. Asbestos of any form or type.
2. Lead in water supply line solder.
3. Lead in paint coatings and finishes.
4. Polychlorinated Biphenyls (PCBs).

B. Upon substantial completion, the Contractor shall submit, on its company letterhead, a signed statement certifying that the products supplied under its Contract had no detectable levels of the hazardous materials listed above in Paragraph 2.5.A. Final payment will not become due until a copy of this letter is submitted.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. General installation of products.
3. Progress cleaning.
4. Starting and adjusting.
5. Protection of installed construction.
6. Correction of the Work.

B. Related Sections include the following:

1. Division 01 Section 01 31 00 "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
2. Division 01 Section 01 73 29 "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
3. Division 01 Section 01 77 00 "Closeout Procedures".

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and points of connection of utility services.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, water-service piping, and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

   a. Description of the Work.
   b. List of detrimental conditions, including substrates.
   c. List of unacceptable installation tolerances.
   d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.02 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Owner not less than 30 days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Owner’s written permission.
3. All utility interruptions shall be scheduled for weekends or holidays.

C. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
D. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.03 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

1. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
2. Inform installers of lines and levels to which they must comply.
3. Check the location, level and plumb, of every major element as the Work progresses.
4. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

3.04 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels exceeding 80 dBA.
F. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.

H. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.05 PROGRESS CLEANING

A. Each Prime Contractor is responsible to comply with progress cleaning. The Site Contractor shall be responsible for overall progress cleaning. If in the opinion of the Construction Manager, any contractor fails to comply with progress cleaning, and upon written request by the Construction Manager to the affected contractor, the Construction Manager shall direct the Architect to prepare a deduct change order. The Owner also reserves the right to perform progress cleaning and deduct the cost from the contractor or contractors responsible. If multiple contractors are at fault, the costs may be apportioned solely in the judgment of the Construction Manager. The Construction Manager may also withhold processing of contractor's payment until cleanup duties are resumed to Construction Manager's satisfaction.

B. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

C. Site: Maintain Project site free of waste materials and debris.

D. Work Areas: Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

E. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended,

use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
G. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
H. Cutting and Patching: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

    1. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

I. Waste Disposal: Burying or burning waste materials on site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
J. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
K. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
L. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.06 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.07 PROTECTION OF INSTALLED CONSTRUCTION

A. When finished work is installed, such as, but not limited to, flooring materials, toilet fixtures, roofing, doors, casework, countertops, finished wall surfaces or other materials that can be damaged during construction, provide appropriate protection immediately after installation to prevent damage.
B. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
C. Comply with manufacturer's written instructions for temperature and relative humidity.
D. Contractors shall not use finished materials and surfaces as ladders, platforms or storage shelves. Tools and toolboxes shall not be placed on finished surfaces without adequate protection.

3.08 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section 01 73 29 "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.
C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

END OF SECTION 01 73 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes general administrative and procedural requirements governing execution of the Work.
B. Requirements and limitations for cutting and patching of Work.

1. A Contractor, subcontractor, or sub-subcontractor requiring the cutting of openings in new Work installed by others shall have such openings cut and patched by the trade which installed the work, and such cutting and patching shall be at the expense of the Contractor, subcontractor, or sub-subcontractor requiring the opening.
2. A Contractor, subcontractor, or sub-subcontractor requiring the cutting of openings or patching of existing materials shall be performed by a sub-contractor with experience in cutting and patching of material being modified and shall be at the expense of the Contractor, subcontractor, or sub-subcontractor requiring the opening.
3. Approval to do such cutting and patching shall be received from the Architect prior to proceeding with the work and shall include installation of such reinforcement of the work as the Architect may direct.
4. All blocking, bracing, reinforcement, or structural enhancement required due to cutting and patching shall be provided at no additional cost to Owner. All patching work shall match adjacent existing Work unless otherwise noted.
5. Contractor, subcontractors, and sub-sub-contractors shall conduct Work in accordance with the Occupational Safety and Health Act of 1970 (OSHA) and all additions, amendments, and revisions thereto.

C. Related Sections include the following:

1. Division 01 Section 01 73 00 “Execution" for additional general administrative and procedural requirements governing execution of the Work.
2. Divisions 02 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
    a. Requirements in this Section apply to plumbing, mechanical, and electrical installations. Refer to Divisions 21 through 28 Sections for other requirements and limitations applicable to cutting and patching plumbing, mechanical, and electrical installations.

1.03 DEFINITIONS

A. Cutting: Removal of existing or in-place construction necessary to permit installation or performance of other Work.

D. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.04 PREINSTALLATION MEETINGS

A. Cutting and Patching Conferences: Prior to commencing Work requiring cutting and patching, meet at Project site with parties involved in cutting and patching to review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching Work. Inform Architect and Construction Manager of scheduled meeting. Require representatives of each Prime Contract directly concerned or affected by the cutting and patching to attend, including the following:

1. Contractor's superintendent.
2. Trade supervisor responsible for cutting operations.
3. Trade supervisor(s) responsible for patching of each type of substrate.
4. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affected by cutting and patching operations.

B. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.05 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:

1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform the Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems

6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and structural calculations showing integration of reinforcement with original structure.
7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.06 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

1. Primary operational systems and equipment.
2. Fire separation assemblies.
3. Air or smoke barriers.
4. Fire-protection systems.
5. Plumbing piping systems.
6. Mechanical systems piping and ducts.
7. Control systems.
8. Communication systems.
9. Fire-detection and -alarm systems.
10. Conveying systems.
11. Electrical wiring systems.
12. Operating systems of special construction.

C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

1. Water, moisture, or vapor barriers.
2. Membranes and flashings.
3. Exterior curtain-wall construction.
4. Sprayed fire-resistive material.
5. Equipment supports.
6. Piping, ductwork, vessels, and equipment.
7. Noise- and vibration-control elements and systems.

D. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1. If possible, retain original Installer or fabricator to cut and patch exposed Work listed below. If it is impossible to engage original Installer or fabricator, engage another recognized, experienced, and specialized firm.

    a. Processed concrete finishes.
    b. Stonework and stone masonry.
    c. Ornamental metal.
    d. Preformed metal panels.
    e. Roofing.
    f. Firestopping.
    g. Window wall system.
    h. Stucco and ornamental plaster.
    i. Terrazzo.
    j. Finished wood flooring.
    k. Wall covering.
    l. HVAC enclosures, cabinets, or covers.

1.07 WARRANTY

A. Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void warranties.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Comply with requirements specified in other Sections of these Specifications.

B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

    1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials. Use materials that are not considered hazardous.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

    1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.
B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

3.03 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently, patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations. Cutting tools or saws shall be equipped with bays or containers, or connected to vacuum systems, to minimize dust.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering, and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as a carborundum saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Each Prime Contractor shall do cutting and patching in existing work or work already constructed required for the work involved in their Contract. Patch holes or openings left by him to match the unaltered existing construction:

1. In Work already constructed, lintels and structural supports required to maintain structural integrity shall be provided by the Contractor whose work requires the opening.
2. Cutting of holes, installation of curbs, and temporary, weatherproof, and secured enclosures for penetrations through the existing Work shall be the responsibility of the Prime Contractor whose work requires the penetration. Actual roof flashing and associated work must be executed by a subcontractor, hired by the Prime Contractor, who is acceptable to the manufacturer of the existing roof which shall be certified, in writing, to the Owner and Architect/Engineer by the manufacturer. Existing warranty/guarantee shall be certified as remaining valid.
3. For penetrations through new work, the Prime Contractor whose work requires the penetration shall be responsible to provide the General Contractor of location, size, and configuration required for the penetration well in advance of the scheduled work. Prime Contractor who requires penetrations through the

new roof construction shall provide the prefabricated roof curb and temporary, weatherproof, and secured enclosure on top of curb.

E. Each Prime Contractor shall employ skilled and experienced installer to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

F. Each Prime Contractor shall submit written request in advance of cutting or altering elements affecting:

1. Structural integrity of element.
2. Integrity of weather-exposed or moisture-resistant elements.
3. Efficiency, maintenance, or safety of element.
4. Visual qualities of sight-exposed elements.
5. Work of Owner or separate contractor.

G. Should conditions of work or the schedule indicate a change of products from original installation, each Prime Contractor shall submit request for substitution as specified in Section 01 60 00 “Product Requirements”.

1. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.
2. After uncovering work, inspect conditions affecting installation of products or performance of work.
3. Report unsatisfactory or questionable conditions to Construction Manager and Architect/Engineer, in writing; do not proceed with Work until Architect/Engineer has provided further instructions.

H. Each Prime Contractor shall submit written notice to Construction Manager designating the date and time the work will be uncovered.

1. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
2. Provide devices and methods to protect other portions of project from damage.
3. Provide protection from elements for that portion of the project exposed by cutting and patching work and maintain excavations free from water.

I. Each Prime Contractor shall execute cutting, fitting, and patching including excavation and fill, to complete Work and to:

1. Make its several parts fit together properly.
2. Uncover portions of the work to provide for installation of ill-timed work.
3. Remove and replace defective work.
4. Remove and replace work not conforming to requirements of the Contract Documents.
5. Remove samples of installed work as specified for testing.
6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

J. Each Prime Contractor shall execute Work by avoiding damage to other work and providing proper surfaces to receive patching and finishing.

K. Each Prime Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
L. Each Prime Contractor shall restore Work with new products in accord with requirements of Contract Documents.
M. Each Prime Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
N. Each Prime Contractor shall maintain integrity of wall, ceiling, or floor construction, and completely seal voids.
O. Each Prime Contractor shall refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.
P. Each Prime Contractor shall identify hazardous substance or condition exposed during the Work and report to the Construction Manager for decision or remedy.

3.04 HAZARDOUS MATERIAL PROVISIONS

A. Potential for Hazardous Materials that may affect the Work: Certain environmental conditions or hazardous materials may exist or be encountered during the Work. Each Prime Contractor shall follow the guidelines listed below for the environmental conditions listed that may exist or be encountered during the Work.
B. The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a hazardous material or substance, including but not limited to asbestos, mercury, or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner, Construction Manager, and Architect of the condition.

1. Lead-Based Paint: Painted and varnished surfaces in buildings built prior to 1978 must be assumed to be coated with lead-based paint. Contractors shall immediately report to Construction Manager any areas suspected to be lead paint for decision or remedy. Contractor shall be responsible for all costs related to removal of lead-based paint items in areas affected by their Work as noted below. All required testing shall be performed in accordance with applicable EPA and HUD standards and guidelines pertaining to lead-based paint inspections.

    a. Lead-Based Paint Disturbance. Each Prime Contractor shall be responsible for lead-based paint disturbance precautions.

        1) For buildings defined as a Child-Occupied Facility (children under the age of 6). When these surfaces are disturbed, that disturbance shall be conducted in accord with the Environmental Protection Agency (EPA) 40 CFR, Part 745 “Lead, Renovation, Repair and Painting Program”. Compliance is to include using EPA licenses and certified trained renovators, Owner and occupant notifications, work area containment, dust minimization, and clean-up certification.

Architect/Engineer shall be copied on the Owner and occupant notifications.

2) For buildings that are not defined as a Child-Occupied Facility (children under the age of 6), all renovation or new construction work that impacts painted components containing lead shall be performed in accordance with the OSHA Lead-in Construction Standard (29 CFR 1926.62), as applicable to the work being performed; and a proper waste management plan shall be utilized to certify that the waste is tested for hazardous waste classification, as applicable, and properly disposed or recycled. Contractors working on the project are responsible for fulfilling all applicable OSHA requirements pertaining to lead, as well as all other applicable federal, state, or local requirements or regulations pertaining to lead-in construction.

b. Lead-Based Paint: Demolition and Handling

1) Contractor shall handle, contain, store, test, transport, and dispose of demolition debris with lead-containing surface coating in accordance with applicable local, state, and federal regulations. Most painted architectural components in fair condition (not blistering, peeling, etc.), by law, may be disposed of as Construction and Demolition (C&D) debris. If deemed necessary for disposal, Contractor shall be responsible for collecting and having analyzed representative samples of the waste. If necessary, samples shall be tested for toxicity using the Toxicity Characteristics Leaching Procedure (TCLP) for lead sufficient to determine whether the debris is a hazardous waste as defined in 40 CFR 261.3, or a residual waste, as defined in 25 PA Code 287.1, and shall include such analysis as required by the disposal facility. A qualified environmental laboratory acceptable to the Architect and Construction Manager shall conduct tests. A copy of all testing shall be forwarded to the Architect, Construction Manager and Owner.

2) The Contractor shall be responsible for the costs of sample collection and laboratory analysis. Alternately, Contractor can assume lead waste generated is a hazardous waste and TCLP testing is not required, but the waste must then be disposed of and transported as hazardous waste.

3) If, based on testing, there is any hazardous waste generated and transferred to a hazardous waste disposal facility, Contractor shall provide, within 45 days from the time the material is transferred to the disposal facility, a waste manifest to the Owner that identifies the disposal facility name and address, EPA Identification Number, the identity of the waste material, and a statement certifying that the waste was disposed at that facility, including the date. Forward original document to Owner with a copy to the Architect and Construction Manager.

2. Polychlorinated Biphenyl (PCB) Light Ballasts and Mercury-Containing Fluorescent Light Fixture Recycling and Disposal

a. PCB Light ballasts:

1) Ballasts demarcated as non-PCB containing may be recycled as non-PCB ballasts in accordance with applicable industry standards for those types of ballasts.
2) Ballast that do not carry a demarcation of non-PCB should be assumed to contain PCB's and recycled as PCB ballasts in a facility that accepts PCB ballasts as universal waste unless they are electronic (no suspect oil). Leaking PCB light ballasts shall be disposed of as hazardous waste unless testing is performed to classify the waste for PCB's.

b. Fluorescent light tubes should be assumed to contain mercury at levels that could deem them "hazardous waste" for disposal purposes. All fluorescent light tubes impacted by renovation or new construction work shall be sent for recycling as universal waste to a facility that accepts mercury-containing light tubes as part of their universal waste program.

END OF SECTION 01 73 29

SECTION 01 77 00 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions and other Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY OF SECTION

A. This Section specifies administrative and procedural requirements for the following, but not limited to:

1. Operation, Maintenance and Emergency Manuals
2. Project Record Procedures
3. Closeout procedures

B. Closeout requirements for specific construction activities are included in the appropriate Sections in included Divisions.

1.03 OPERATION AND MAINTENANCE MANUAL CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of respective Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect.
    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit a draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Agent will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Agent will return copy with comments.

1.04 PREPARATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Organization: Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of a system, list alphabetically in separate list.
D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.05 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in the manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.

1.06 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.

3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.07 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has been delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

1.08 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

1.09 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Training

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

1.10 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.

2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of Owner for newly prepared record Drawings for "Project Record Documents."

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

PART 2 - PROJECT RECORDS

2.01 ADMINISTRATIVE AND PROCEDURAL REQUIREMENTS

A. Administrative and procedural requirements for Project Record Documents.

1. Project Record Documents required include:

a. Marked-up copies of Contract Drawings.
b. Marked-up copies of Shop Drawings.
c. Newly prepared Drawings.
d. Marked-up copies of Specifications, addenda and Change Orders.
e. Marked-up Product Data submittals.
f. Record Samples.

g. Field records for variable and concealed conditions.
h. Record information on Work that is recorded only schematically.

2. Maintenance of Documents and Samples: Store record documents and Samples in the field office apart from Contract Documents used for construction. Do not permit Project Record Documents to be used for construction purposes. Maintain record documents in good order, and in a clean, dry, legible condition. Always make documents and Samples available for inspection by the Architect.

2.02 RECORD DRAWINGS

A. Mark-up Procedure: During the construction period, maintain a set of blue-line or black-line white-prints of Contract Drawings and Shop Drawings for Project Record documentation purposes.

1. Mark these Drawings to indicate the actual installation where the installation varies appreciably from the installation shown originally. Give particular attention to information on concealed elements which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:

a. Dimensional changes to the Drawings.
b. Revisions to details shown on the Drawings.
c. Changes made by Change Order.
d. Details not on original Contract Drawings.

2. Mark completely and accurately record on prints of Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions. Where Shop Drawings are marked, show cross-reference on Contract Drawings location.
3. Mark record sets with red erasable colored pencil; use other colors to distinguish between changes for different categories of the Work at the same location.
4. Mark important additional information which was either shown schematically or omitted from original Drawings.
5. Note construction change directive numbers, alternate numbers, Change Order numbers and similar identification.
6. Responsibility for Markup: Where feasible, the individual or entity who obtained record data, whether the individual or entity is the installer, subcontractor, or similar entity, is required to prepare the mark-up on record Drawings.

a. Accurately record information in an understandable Drawing technique.
b. Record data as soon as possible after it has been obtained. In the case of concealed installations, record and check the mark-up prior to concealment.
c. At time of Substantial Completion, submit record Drawings to Engineer/Architect or Construction Manager for the Engineer/Architect's approval. Upon Engineer/Architect's approval, the Drawings will then become the Owner's records. Organize into sets, bind and label sets for Owner's continued use.

7. Preparation of Transparencies: Immediately prior to inspection for Certification of Substantial Completion, review completed marked-up record Drawings with the Architect. When authorized, prepare a full set of corrected transparencies of Contract Drawings and Shop Drawings.

    a. Incorporate changes and additional information previously marked on print sets. Erase, redraw, and add details and notations where applicable. Identify and date each Drawing; include the printed designation "PROJECT RECORD DRAWINGS" in a prominent location on each Drawing.
    b. Refer instances of uncertainty to the Architect for resolution before submitting.
    c. One set of original Contract Drawings will be furnished to the Contractor by the Owner for use in recording changes and additional information. Other printing as required is the Contractor's responsibility.
    d. The Contractor is responsible for printing original Contract Drawings and other Drawings as required to produce transparencies. The Engineer/Architect will make original Contract Drawings available to the Contractor's print shop.
    e. Copies and Distribution: After completing the preparation of transparency record drawings, print two (2) blue-line or black-line prints of each Drawing, whether or not changes and additional information were recorded. Organize the copies into manageable sets. Bind each set with durable paper cover sheets, with appropriate identification, including titles, dates and other information on cover sheets.

        1) Organize and bind original marked-up set of prints that were maintained during the construction period in the same manner.
        2) Organize record transparencies into sets matching the print sets. Place these sets in durable tube-type Drawing containers with end caps. Mark the end cap of each container with suitable identification.
        3) Submit the marked-up record set, transparencies, and two (2) copy sets to the Architect for Owner's records; the Architect will retain one copy set.

2.03 RECORD SPECIFICATIONS

A. During the construction period, maintain one (1) copy of the Project Specifications, including addenda and modifications issued, for Project Record Document purposes.

1. Mark the Specifications to indicate the actual installation where the installation varies substantially from that indicated in Specifications and modifications issued. Note related Project Record Drawing information, where applicable. Give particular attention to substitutions, selection of product options, and information on concealed installations that would be difficult to identify or measure and record later.

    a. In each Specification Section where products, materials or units of equipment are specified or scheduled, mark the copy with the proprietary name and model number of the product furnished.

2. Upon completion of mark-up, submit record Specifications to the Architect for Owner's records.

2.04 RECORD PRODUCT DATA

A. During the construction period, maintain one (1) copy of each Product Data submittal for Project Record Document purposes.

1. Mark Product Data to indicate the actual product installation where the installation varies substantially from that indicated in Product Data submitted. Include significant changes in the product delivered to the site, and changes in manufacturer's instructions and recommendations for installation.
2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
3. Note related Change Orders and mark-up of record Drawings, where applicable.
4. Upon completion of mark-up, submit a complete set of record Product Data to the Architect for the Owner's records.
5. Where record Product Data is required as part of maintenance manuals, submit marked-up Product Data as an insert in the manual, instead of submittal as record Product Data.
6. Each Contractor is responsible for mark-up and submittal of record Product Data for its own Work.

2.05 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Engineer/Architect's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black-line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. See Section 01 30 00 Administrative Requirements for additional information on Record Drawings.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
2. Mark new information that is important to the Owner but was not shown on Contract Drawings or Shop Drawings.
3. Note related Change Order numbers where applicable.
4. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the test of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observations. Note related record drawing information and Product Data.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records. See Section 01 30 00 Administrative Requirements for additional information on Record Drawings.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Engineer/Architect and/or Construction Manager for the Owner's records. See Section 01 30 00 Administrative Requirements for additional information on Record Drawings.

2.06 MISCELLANEOUS RECORD SUBMITTALS

A. Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Immediately prior to Substantial Completion, complete miscellaneous records and place in good order, properly identified, and bound or filed, ready for use and reference. Submit to the Engineer/Architect or Construction Manager for the Owner's records.

1. Categories of requirements resulting in miscellaneous records include, but are not limited to the following:

a. Field records on excavations and foundations.
b. Field records on underground construction and similar Work.
c. Survey showing locations and elevations of underground lines. Invert elevations of drainage piping.
d. Surveys establishing building lines and levels.
e. Authorized measurements utilizing unit prices or allowances. Records of plant treatment.
f. Ambient and substrate condition tests.
g. Certifications received in lieu of Labels on bulk products. Batch mixing and bulk delivery records.
h. Testing and qualification of tradesmen.
i. Documented qualification of installation firms.
j. Load and performance testing.
k. Inspections and certifications by governing authorities.
l. Leakage and water-penetration tests.
m. Fire resistance and flame spread test results.
n. Final inspection and correction procedures.

2.07 RECORDING

A. Post changes and modifications to the Documents as they occur. Do not wait until the end of the Project. The Engineer/Architect and/or Construction Manager will periodically review record documents to assure compliance with this requirement.

PART 3 - COMPLETION AND FINAL CLEANING

3.01 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following: List exceptions in the request.

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

    a. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.

2. Advise Owner of pending insurance change-over requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
4. Remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

B. Inspection Procedures: On receipt of a request for inspection, the Engineer/Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Engineer/Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer/Architect will repeat inspection when requested and assured that the Work has been substantially completed.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

3.02 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required. Conform to the requirements of Section

01 29 00 - Payment Procedures.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
3. Submit a certified copy of the Engineer/Architect's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, and the list has been endorsed and dated by the Engineer/Architect.
4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.
5. Submit consent of surety to final payment.
6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Re-inspection Procedure: The Engineer/Architect will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the Engineer/Architect.

1. Upon completion of re-inspection, the Engineer/Architect will prepare a certificate of final acceptance or advise the Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
2. If necessary, re-inspection will be repeated.

3.03 CLOSEOUT SUBMITTALS

A. When the Owner has determined that the Work is acceptable under the Contract Documents and the Contract fully performed, Contractor shall prepare and submit final Application for Payment to the Engineer/Architect together with, but not limited to, the following:

1. Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706 (most recent edition of form).
2. Contractor's Affidavit of Release of Liens, AIA Document G706A (most recent edition of form).
3. Contractor's Lien waiver in the full amount of the Contract Sum.
4. Lien waivers from all subcontractors, sub-subcontractors and major material suppliers who have furnished material for the work under the contract with the Trade Contractor or a subcontractor. The lien waivers shall be in the full amount of the contract involved.
5. Consent of Surety Company to Final Payment, AIA Document G707, (most recent edition of form).
6. Evidence of Compliance with requirements of governing authorities:
    a. Certificate of Inspection from all required agencies and departments.
    b. Certificate of Occupancy.
7. Project Record Documents.
8. Operating and Maintenance Data, Instructions to Owner's Personnel.
9. Warranties and Bonds.

10. Special tools required for Owner maintenance.

3.04 FINAL CLEANING

A. The Contractors shall furnish all labor, materials, tools, equipment, and perform all work and services necessary for cleaning up required in conjunction with work performed, as shown on drawings and as specified, in accordance with provisions of the Contract Documents and completely coordinated with work of all other trades.
B. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
C. Administrative and procedural requirements for final cleaning at Substantial Completion:

1. Special cleaning requirements for specific elements of the Work are included in appropriate Sections of included Divisions.
2. Multiple Prime Contracts: Except as otherwise indicated, each Prime Contractor is responsible for coordination of final cleaning where more than one Prime Contractor is involved in final cleaning a single area or piece of equipment.
3. Environmental Requirements: Conduct cleaning and waste disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.

    a. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary drains.
    b. Burning or burying of debris, rubbish or other waste material on the premises is not permitted.
    c. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property, or that might damage finished surfaces.

END OF SECTION 01 77 00

SECTION 02 41 16 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings and site improvements.
2. Disconnecting, capping or sealing, and removing site utilities.

B. Related Requirements:

1. Section 011000 "Summary" for use of the premises and phasing requirements.
2. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before building demolition.
3. Section 311000 "Site Clearing" for site clearing and removal of above- and below-grade site improvements not part of building demolition.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

1.3 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.

1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for noise control and dust control.
6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to Owner.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

B. Engineering Survey: Submit engineering survey of condition of building.

C. Schedule of Building Demolition Activities: Indicate the following:

1. Detailed sequence of demolition work, with starting and ending dates for each activity.
2. Temporary interruption of utility services.
3. Shutoff and capping or re-routing of utility services.

D. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.

E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.8 FIELD CONDITIONS

A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.

1. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.

a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before building demolition, Owner will remove the following items:

a. Movable furniture not built into structure or bleachers sytem.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. On-site storage or sale of removed items or materials is not permitted.

1.9 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

2.2 SOIL MATERIALS

A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting demolition operations.

B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.

3.2 PREPARATION

A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Utilities to Be Disconnected: Locate, identify, disconnect, and seal or cap off utilities serving buildings and structures to be demolished.
   1. Arrange to shut off utilities with utility companies.
   2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
   3. Cut off pipe or conduit a minimum of 24 inches (610 mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
   4. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

3.4 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of demolition.

C. Existing Utilities to Remain: Maintain utility services to remain and protect from damage during demolition operations.

1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.

D. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."

1. Protect adjacent buildings and facilities from damage due to demolition activities.
2. Protect existing site improvements, appurtenances, and landscaping to remain.
3. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
4. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
5. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
6. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
7. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

E. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.5 DEMOLITION, GENERAL

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
2. Maintain fire watch during and for at least two hours after flame-cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

C. Explosives: Use of explosives is not permitted.

3.6 DEMOLITION BY MECHANICAL MEANS

A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

C. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

D. Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

3.7 SITE RESTORATION

A. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.8 REPAIRS

A. Promptly repair damage to adjacent buildings caused by demolition operations.

3.9 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn demolished materials.

3.10 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.

1. Clean roadways of debris caused by debris transport.

END OF SECTION 02 41 16

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings and piers.
   2. Walls.
   3. Interior and exterior slabs on grade.
   4. Interior and exterior stairs.
   5. Utilities.
   6. Concrete rehabilitation (patching)

B. Related Sections include the following:
   1. Division 07 Section “Waterproofing”.
   2. Division 31 Section “Earth Moving” for stone subbase below slabs on grade.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

B. Defective Slab: A slab not meeting any of the following requirements:
   1. Specified thickness, flatness, levelness or variation from elevation.
   2. Specifications for maximum moisture content in flooring finish sections.
   3. A floor slab rejected by installers of flooring finishes to be applied to slabs for non-compliance with manufacturer's requirements for floor finish and moisture content.
   4. Free of excessive cracking.
   5. Free of individual cracks greater than 1/16 inch thick.
   6. Specified compressive strength.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site such that specified water to cement ration is not exceeded.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop

spacing, and supports for concrete reinforcement. Provide shop drawings in advance of concrete construction and prior to delivery of reinforcing steel to the site such that all of engineer's review comments can be addressed prior to fabrication and delivery of reinforcing steel.

D. Qualification Data: For manufacturer and testing agency.

E. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

F. Material Certificates: For each of the following, signed by manufacturers:
   1. Cementitious materials.
   2. Admixtures.
   3. Steel reinforcement and accessories.
   4. Curing compounds.
   5. Vapor retarders/barriers.

G. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.

H. Field quality-control test and inspection reports.

I. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for concrete and source of aggregates.
   1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
   2. Manufacturer shall be PennDOT approved.

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
   1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

F. Concrete Testing Service: Owner will engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Cast-in-place concrete subcontractor
      e. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place concrete.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.
   2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      a. High-density overlay, Class 1 or better.
      b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
      c. Structural 1, B-B or better; mill oiled and edge sealed.
      d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

C. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.

2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

D. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

E. Forms and templates which are worn, bent, warped, or broken shall not be used. The forms shall be accurately set to line and grade in a manner to prevent settlement or displacement.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Welded Wire Fabric Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire woven into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Dowel Bars: ASTM A 615, Grade 60, plain-steel bars.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 WATERSTOPS

A. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.
1. Products: Product shall be compatible and approved by waterproofing membrane supplier. Subject to compliance with requirements, provide one of the following:
a. Carlisle Coatings & Waterproofing, Inc.; MiraSTOP.
b. CETCO; Volclay Waterstop-RX.
c. Concrete Sealants Inc.; Conseal CS-231.
d. Sika Corporation; Swellstop.
e. Henry Company, Sealants Division; Hydro-Flex.
f. JP Specialties, Inc.; Earth Shield Type 20.

2.5 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type I gray. Contractor's option to supplement with the following:
a. Fly Ash: ASTM C 618, Class F.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
   1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94and potable.

2.6 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
   2. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
   3. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

2.7 VAPOR RETARDERS

A. Plastic Vapor Retarder:
   1. Description: ASTM E 1745, Class A. Not less than 15 mils thick, unless noted otherwise.
   2. Include manufacturer's recommended adhesive or pressure-sensitive tape.
   3. Performance: Physical properties not less than the following when tested according to ASTM E 96:
      a. Water Vapor Permeance: 0.012 perms.
      b. Water Vapor Transmission Rate: 0.006 g/sf/hr or lower.
   4. Products: Subject to Compliance with requirements, provide one of the following:
      a. Fortifiber Corporation; Moistop Ultra 15.
      b. Raven Industries Inc.; Vapor Block 15.
      c. Reef Industries,; Gryffolyn T-105.
      d. Stego Industries, LLC; Stego Wrap, 15 mils.
      e. W. R. Meadows; Perminator 15 mils.
      f. Viper VaporCheck II, 15 MIL

2.8 FLOOR AND SLAB TREATMENTS (Sealed Concrete)

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
   1. Locations: Apply penetrating liquid floor treatment to exposed concrete floors at interior areas that call for “Sealed Finish”.
   2. Products: Subject to compliance with requirements, provide one of the following:
      a. Dayton Superior Day-Chem Sure Hard(J-17).
      b. Conspec by Dayton Superior: Intraseal.
      c. ChemMasters; Chemisil Plus.
      d. L&M Construction Chemicals, Inc.; Seal Hard.
      e. Meadows, W. R., Inc.; Liqui-Hard.

2.9 CURING MATERIALS

A. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

B. Water: Potable.

C. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
   1. Locations: Apply to exposed interior concrete floors not indicated for another finish
   2. Products: Subject to compliance with requirements, provide one of the following.
      a. Burke by Edoco; Cureseal 1315 WB.
      b. ChemMasters; Polyseal WB.
      c. Lambert Corporation; UV Safe Seal.
      d. L&M Construction Chemicals, Inc.; Lumiseal FX.
      e. Meadows, W. R., Inc.; Vocomp-30.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips:
   1. Exterior Applications: ASTM D 1751, asphalt-saturated cellulosic fiber
   2. Interior Applications: Closed cell isomeric polymer foam.
      a. Product: Subject to compliance with requirements, provide "Ceramar"; W.R Meadows or approved equivalent.

B. Key Joints for Slabs-on-Grade: Provide joint forming units with removable cap to create void for joint sealant.
   1. Product: Key-Loc Joint System; Form-A-Key Products Div., Cardinal Manufacturing Company, Inc.

C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion, PVA or styrene butadiene.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Application: Repair of new non-compliant floors indicated to receive another finish other than paint.
   2. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   3. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   4. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
   5. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Application: Repair of new non-compliant floors indicated to receive no finish other than paint.
   2. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   3. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

4. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
5. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.
6. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   a. "Levelayer III" by Dayton Superior.
   b. "Levelex HS" by L&M Construction.
   c. "Certi-Vex SLU TC" by Vexcon.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Do not use fly ash in exterior concrete slabs or pavements.

C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement for exterior applications of concrete and to 1.00 percent by weight of cement for interior applications.

D. Admixtures: Use admixtures according to manufacturer's written instructions.
   1. Use water-reducing or high-range water-reducing admixture in concrete, as required, for placement and workability.
   2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

E. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.13 CONCRETE MIXTURES FOR BUILDING AND SITE ELEMENTS

A. Footings, Foundation Walls, Retaining Walls and Piers: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 4000 psi.
   2. Maximum Slump: 5 inches.
      a. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with 2- to 4-inch slump.
   3. Maximum Water-Cement Ratio: 0.45.
   4. Air entrain as specified below for partially exterior and fully exterior elements.

B. Slab-on-Grade Ramps, Curbs and Steps: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 5000 psi.
   2. Maximum Slump: 4 inches.
      a. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches after admixture is added to concrete with 2- to 4-inch slump.
   3. Maximum Water-Cement Ratio: 0.45.

4. Air entrain as specified below for exterior elements.

C. Air Content for Exterior Concrete Elements Subject to Freezing: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows within a tolerance of plus 1 or minus 1.5 percent, unless otherwise indicated:
1. Air Content: 6 percent plus or minus one percent for 3/4-inch-nominal maximum aggregate size.
2. Do not air entrain concrete for interior floors.

D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Patching and Repair Products: Mix in accordance with manufacturer’s written instructions.

PART 3 - EXECUTION

3.1 PREPARATION FOR CONCRETE REHABILITATION

A. Areas to be repaired must be clean, sound, and free of contaminants. All loose and deteriorated concrete shall be removed by mechanical means. Mechanically prepare the concrete substrate to obtain a surface profile of +/- 1/16” (CSP 5 or greater as per ICRI Guidelines) with a new exposed aggregate surface. Area to be patched shall not be less than 1/2” in depth.

B. Where reinforcing steel with active corrosion is encountered, sandblast the steel to a white metal finish to remove all contaminants and rust. Where corrosion has occurred due to the presence of chlorides, the steel shall be high pressure washed after mechanical cleaning. Prime steel in accordance with patching manufacturer’s requirements.

3.2 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class B, 1/4 inch for rough-formed finished surfaces.

D. Footings: Form exterior side of footings to accept waterproofing.

E. Construct forms tight enough to prevent loss of concrete mortar.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete ¾" unless noted otherwise.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.3 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.4 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 48 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength, as determined by compression testing of field cured concrete cylinders.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 VAPOR RETARDERS/BARRIERS

A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
1. Lap joints 6 inches and seal with manufacturer's recommended tape. Turn barrier up wall and terminate per manufacturer's requirements.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when concrete has hardened sufficiently such that cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
   2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

F. New to Existing Joints: Bush hammer sawn surfaces of existing to create mechanical bond, do not damage top edge of face where exposed to view in finished work. Drill for dowels, set with grout. Apply bonding compound to concrete interface in accordance with manufacturer's recommendations. Place new concrete in accordance with these specifications.

3.8 WATERSTOPS

A. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect and only if allowed for in approved mix design.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
   1. Deposit concrete in horizontal layers of depth in a manner to avoid inclined construction joints.
   2. Deposit and consolidate concrete for walls in a continuous operation, within limits of construction joints, until placement of a panel or section is complete, without introducing horizontal construction joints.
   3. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   4. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that

have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
   1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
   2. Maintain reinforcement in position on chairs during concrete placement.
   3. Screed slab surfaces with a straightedge and strike off to correct elevations.
   4. Slope surfaces uniformly to drains where required.
   5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
   2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 305.1 and 301 and as follows:
   1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

G. Concrete footings in sections are assumed to be formed. Where earth is used as forms, the contractor is not entitled to additional concrete costs due to extra quantities required due to the use of earthen forms.

3.10 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces to receive a rubbed finish, and surfaces to be covered with a coating or covering material applied directly to concrete.

B. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where concrete is exposed to view:
   1. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match

adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method and where epoxy flooring is to be applied. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

C. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply light broom finish to concrete indicated to be covered with Underlayment or Topping.
2. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.
4. Do not finish air entrained concrete with steel trowel.

E. Pour concrete slabs level such that slab thickness will increase due to deflected shape of supporting steel beams. Assume that steel beams will deflect a minimum of L/240 and the steel deck will deflect at least ½” under the weight of wet concrete. No change orders will be approved for additional concrete quanities due to the deflected shape of supporting structural elements.

3.12 EXTERIOR SLABS ON GRADE, STEPS AND APRONS

A. General: Concrete walks and aprons shall be constructed as shown on the plans. They shall be constructed with welded wire mesh as noted. Sidewalks shall be minimum four inches (4”) thick. Driveway aprons shall be minimum six inches (6”) thick unless noted otherwise on plans.

B. Contractor will replace any work exceeding these parameters at no additional expense to the Owner.

C. Sub-grade shall be prepared and stone base installed and compacted prior to installing forms. Work shall include removal and disposal of old concrete. Engineer shall be called to inspect sub-grade, forming, and reinforcing prior to pouring concrete.

D. Grade Adjustments and Utility Cover Extensions:
1. Grade adjustments of existing manholes, utility and signal boxes, and all other existing structures shall be made prior to the start of any paving or ramp work. This includes any grade adjustment for a revised vertical height and slope to match proposed slopes. Adjustment shall include rebuilding existing structure where required.
2. Manhole and inlet extensions shall meet PennDOT standards and be approved by the engineer prior to use.
3. Before placing paving or ramp material, set adjustable extension units in the existing inlet or manhole frame with the section resting on the flange. Secure the unit in place in accordance with the manufacturer's instructions.
4. Relocation of signal boxes shall include moving the box, relocating wiring as required and adjusting the box elevation to match the required grade.
5. Relocation of PECO boxes shall be coordinated with PECO. Contractor's work to include removal of concrete and preparation of sub-grade as required for PECO to re-locate the box. Contractor is responsible for scheduling PECO around other work at the intersection.
6. When required by project notes on drawings, Contractor shall supply detailed drawings in accordance with RC-67M for approval by the Owner and local authorities prior to construction.

E. All forms shall be set true to line and grade and held rigidly in position. They shall be either of metal or of acceptable planned and mated lumber, and of such construction that there will be no interference to inspection grade and alignment and that a smooth surface will be provided.

F. ADA Compliant Curb Ramps and Driveway Aprons
1. Where shown on the plans, ADA ramps shall be installed utilizing all applicable provisions found in sections 7.1 and 7.2 plus the following:
2. All elements of construction must meet or exceed the dimensional requirements found in RC-67M and the Penn DOT District 6-0 guidelines dated October 5, 2010
3. Elements should be installed to the plan elevations with the flattest slopes possible. All slopes and dimensions must meet or exceed the requirements of RC-67M. Maximum slope of any part of the handicap entrance ramp or curb ramps shall be 8.2% and maximum cross slope shall be 2.0%. Landings shall have a maximum slope of 2.0% in any direction. Contractor will replace any work exceeding these parameters at no additional expense to the owner.
4. All slopes are measured with respect to a level plane. A digital level should be available on site at all times to verify formwork and installed elements
5. Depressed curb for ramps must be flush with the adjacent roadway but be sloped up from the road at a grade matching the ramp slope. Edge of road must be set and flow line shall be graded to maintain a minimum grade of 0.5% and prevent ponding in front of the ramp.
6. Provide a slip resistant texture on curb ramp by coarse brooming transverse to the slope of the ramp. Extend texture the full width and length of the curb ramp including the flared side ramps.
7. All ADA compliant Ramps and curb shall be constructed monolithically.

G. Sidewalks:
1. Proposed sidewalk shall have a slope of 5% maximum along the direction of travel and a cross slope of at least 1% and no more than 1.8%. Proposed sidewalk must match and

be flush with the existing walk at the limit of work. If the cross slope adjustment is 0.5" or less, the adjustment to the new walk may be made in the first block. If greater than 0.5", the adjustment should be made over two blocks.

H. Sidewalk step sections where shown on the plans shall be adjusted to accommodate the actual finish grades meeting the minimum requirements of 7" maximum rise and 11" minimum run.

I. After the concrete has been placed, floated and screeded, the final finishing shall be delayed sufficiently to prevent the finishing operations from working an excess of fine materials to the surface. The surface shall receive a course broom finish to provide a slip resistant surface in all weather conditions.

J. The sidewalks shall be scored in blocks of the same lengths as the width of the walk, and the edges of the sidewalk and the transverse joints shall be finished with a one-quarter inch (1/4") edging tool. One-half inch (1/2") pre-molded expansion joint material shall be placed between the back of the curb and the sidewalk, and at all points where the walk or steps abut the buildings or permanent structures or existing walks, and at the transverse expansion joints placed every twenty feet (20')

K. Longitudinal contraction joints shall be placed in cases where the width of the sidewalk exceeds five feet (5') as shown on the drawings or as directed by the Engineer.

L. Expansion joints shall also be placed where a change in thickness occurs, i.e., at both sides of a driveway entrance.
   1. Provide expansion joints in sidewalks at 25 maximum spacing.

M. The forms shall be left in place at least twenty-four (24) hours or until the concrete has set sufficiently so that, in the opinion of the Engineer, they can be removed without damage to the walk.

3.13 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Exterior Curbs:
   1. Excavation shall be made to required depth, and the material upon which the curb is to be constructed shall be compacted to a firm, even surface. Engineer shall be called to inspect sub-grade and forming prior to pouring concrete
   2. The concrete shall be placed in the forms in horizontal layers not to exceed five inches (5"), and spaded sufficiently to eliminate all voids. An approved vibrator may be used when permitted by the Engineer.

3. Where indicated or directed, drainage openings shall be made through the curb at the elevation and of the size required. The curb shall be the depressed as indicated or directed. The top surface of the curb shall be finished true to line and grade in a smooth, neat and even manner by means of wood float, and the edges of the face and back shall be rounded to a radius of not more than three-quarters (3/4) of and inch and one quarter (1/4) of an inch respectively, while the concrete is still plastic. The finished curb surface shall be free from voids and honeycomb. Any additional surface finishing required shall be performed immediately.
4. The curb shall be constructed in uniform lengths or sections of ten feet (10'), except where shorter lengths are necessary for closures or curves, but no section shall be less than four feet (4'). Premolded expansion joint filler three-quarters (3/4) of an inch in thickness and cut to conform to the cross-section of the curb, shall be placed at the ends of sections of curved curb and at intervals of not more than 93 feet. Intermediate joints between sections shall be formed of 2 thickness of 1-ply bituminous paper, cut neatly to the cross-section of handling the work is such that the templates cannot be removed satisfactorily, the curb shall be constructed in alternate sections.
5. The forms shall not be removed within 12 hours after the concrete has been placed. No rubbing to correct irregularities will be permitted until the full curing period has elapsed. Any irregular surface shall be corrected by rubbing with a Carborundum stone.
6. Brush finishing or plastering will not be permitted and all rejected curb shall be promptly removed and replaced at no expense to the owner. I. All joints in the curb shall be opened from top to bottom immediately after the forms are removed, and the edges adjacent to the joints shall be sharp and clean-cut. After the forms are removed, minor defects shall be filled with mortar composted of 1 part of cement and 2 parts of fine aggregate.
7. Curing: The curb shall be cured and protected as specified in PennDOT Specifications Form # 408. After finishing, spray with curing agent.
8. After the concrete has attained the required strength, the spaces in front and back of the curb shall be backfilled with approved material in layers of not more than four inches (4") in depth, which shall be thoroughly compacted mechanically to the required elevation and cross-section.

3.14 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   d. Alternative vapor retarder spray applied product.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
3. Curing and Sealing Compound: Apply uniformly to interior floors and slabs indicated to receive no other finish in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
   a. Apply final coat immediately before substantial completion.
   b. Do not seal concrete floors scheduled for painting, topping, underlayment or locations with applied finishes.

3.15 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.16 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
   1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

D. Moisture Content: Where moisture content of floor slab is not within requirements for applied flooring materials when tested 3 weeks before planned application of floor finishes, perform corrective work as follows:
1. Shot-blast entire floor surface, expose shot blasted floor to humidity- and temperature-controlled air environment for 7 days, then repair as specified above for correction of other low areas scheduled to receive floor coverings. Provide temperature and humidity control according to requirements in Division 01 Section "Temporary Facilities and Controls.

E. Perform structural repairs and rehabilitation of concrete using patching mortar in accordance with manufacturer’s recommendations.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.17 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. Retesting required as a result of failure to comply with specifications shall be by Contractor.

B. Inspections:
1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.

5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.
7. See structural drawings for additional concrete inspection requirements.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture up to 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
   2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
      b. Concrete Test Cylinders are required for curb and sidewalk: Provide strength tests of concrete with a minimum of one sample (4 cylinders) per truck delivery, and one sample (1) per mix design. Provide 7 day and 28 day break results in accordance with ACI 318 and ASTM C39. (Addendum 2)
   3. Maintain accurate records identifying concrete placed that is associated with each batch of samples tested, such that concrete found to be in non-compliance can easily be identified in the field.
   4. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   5. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   6. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   7. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   8. Compression Test Specimens: ASTM C 31/C 31M.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
      b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
      c. Cast and laboratory cure one standard cylinder for each composite sample.
   9. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
      a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
      b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
      c. Hold one laboratory cured cylinder for testing at 56 days at the discretion of the Architect.
   10. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
   11. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive

strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

12. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
13. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
14. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
15. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
16. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.

END OF SECTION 03 30 00

SECTION 03 30 02 - CAST-IN-PLACE CONCRETE FOR UTILITIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes, for non-critical applications of concrete and for projects using small quantities of concrete.

1. Work involves cast in place concrete associated with utility installation including:

a. Base slabs.
b. Encasements.
c. Pipe encasements.
d. Thrust blocking.
e. Miscellaneous.
f. Other Work as indicated on the drawings.

B. Related Sections include the following:

1. Division 01 Section “Construction Waste Management” for additional information and procedures.
2. Division 31 Section "Excavation, Backfill and Compaction of Utilities".
3. Division 32 Section "Concrete Paving" for concrete pavement and walks.
4. Division 33 Section "Water Utility Distribution Piping".
5. Division 33 Section "Sanitary Sewage".
6. Division 33 Section "Storm Drainage Utilities".

1.3 SUBMITTALS

A. General: In addition to the following, comply with submittal requirements in ACI 301.

B. Product Data: For each type of product indicated.

C. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. Source Limitations: Obtain each type of cement of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.

C. Comply with ACI 301, "Specification for Structural Concrete," including the following sections, unless modified by requirements in the Contract Documents:

1. "General Requirements."
2. "Formwork and Formwork Accessories."
3. "Reinforcement and Reinforcement Supports."
4. "Concrete Mixtures."
5. "Handling, Placing, and Constructing."
6. "Lightweight Concrete."

D. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 82, as drawn.

C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:

1. Class A:

a. 28 day compressive strength: 3300 psi
b. Slump: 1 to 3 inches.

2. Class A-A:

a. 28 day compressive strength: 3750 psi
b. Slump: 1 to 3 inches.

B. Cement Factor and Maximum Water-Cement Ratio conforming to Table A, Section 704.1[b], Publication 408 Specifications.

C. Water: ASTM C 94/C 94M; potable.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

3.3 CONCRETE PLACEMENT

A. Comply with ACI 301 for measuring, batching, mixing, transporting, and placing concrete.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

C. Do not add water to concrete during delivery, at Project site, or during placement.

D. Consolidate concrete with mechanical vibrating equipment.

3.4 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

3.6 REPAIRS

A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 03 30 02

SECTION 03 54 16 HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Medium strength self-leveling cementitious underlayment for use below interior floor coverings.
   2. Skimcoat Patch & Finishing Underlayment.
   3. Concrete Sub-floor Crack Repair products and procedures (as required or referenced on drawings).

B. Related Sections:
   1. Division 09 Sections: Reference for related floor finish products

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Plans indicating substrates, locations, and average depths of underlayment and topping based on survey of substrate conditions.

C. Manufacturer Certificates: Signed by manufacturers of both underlayment and floor covering system certifying that products are compatible.

D. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment and topping products required for this Project.

B. Manufacturer's Representative: Experienced with manufacturer's systems and project conditions.

C. Product Compatibility: Manufacturers of both underlayment and floor covering system certify in writing that products are compatible.

D. Mockups: Apply hydraulic-cement-based underlayment and topping mockups to demonstrate surface finish, bonding, texture, tolerances, and standard of workmanship.
   1. Apply mockups approximately 100 sq. ft. in area in location indicated or, if not indicated, as directed by Architect. Provide one mockup each for underlayment and topping.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature and humidity, ventilation, and other conditions affecting underlayment performance.
   1. Conduct crack repairs and place hydraulic-cement-based underlayments and toppings only when ambient temperature and temperature of substrates are between 50 and 80 deg. F.

1.7 COORDINATION

A. Coordinate application of underlayment with requirements of floor covering products, including adhesives, specified in Division 09 Sections, to ensure compatibility of products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Products: Subject to compliance with requirements, provide one of the products specified.
   2. Basis of Design Product: Provide product specified. Comply with Division 01 requirements for substitutions of basis of design products.

2.2 HYDRAULIC-CEMENT-BASED UNDERLAYMENTS (Self-Leveling)

A. Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thicknesses of 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Basis-of-Design Products - Subject to compliance with requirements, provide one of the following:
      a. Ardex; V-1200
      b. MAPEI Corporation; Ultraplan 1.
      c. UZIN; NC 150
   2. Performance and Physical Properties: Meet or exceed the following values for material cured at 73° F+/-3°F (23° C+/-3°C) and 50% +/-5% relative humidity:
      a. Application: Barrel Mix or Pump
      b. Flow Time: 10 minutes
      c. Final Set: Approx. 90 minutes
      d. Compressive Strength: 4500 psi (315 kg/cm2) at 28 days, ASTM C109M.
      e. Flexural Strength: 1000 psi (70 kg/cm2) at 28 days, ASTM C348.
      f. VOC: 0

B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.

1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.

C. Water: Potable and at a temperature of not more than 70 deg F.

D. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

2.3 SKIMCOAT PATCH AND FINISHING UNDERLAYMENT

A. General: Quick drying, patching and smoothing compound that can be troweled from a true featheredge up to 1/2" in a single application. For use over interior concrete, wood, moisture-insensitive tile and stone, cutback and other non-water soluble adhesive residues on concrete.
1. Product to be used for subfloor preparation according to floor finish manufacturer's recommendations. Applications include, but are not limited to:
a. Flash patching subfloor over concrete to minimize flooring finish transitions
b. Plywood underlayment seam filler

B. Basis-of-Design Products - Subject to compliance with requirements, provide one of the following:
1. Ardex Feather Finish- Self Drying Cement Based Underlayment
2. Uzin 866 - Skim & Repair Compound

2.4 CRACK REPAIR COMPONENTS (Concrete Subfloor)

A. Basis-of-Design Products: Provide products listed below as manufactured by Sika Corp, or provide equivalent products as supplied by Conproco, Mapei or Ardex.
1. Repair Mortar: Sikacrete 211, Product 557-500.
2. Epoxy Mortar: One to one mix of Sikadur 32, Hi-Mod. Product 770 and oven dried silica sand.
3. Crack Filler: Sikadur 52, Product 396.
4. Gel Type Crack Filler: Sikadur 31, High Mod Gel, Product 390.
5. Low Viscosity Rigid Polyurethane Crack and Joint Repair: ARDEX ARDIFIX™; Manufactured by ARDEX Americas: 400 Ardex Park Drive, Aliquippa, PA, 15001, USA, (724) 203-5000, www.ardexamericas.com

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

2.5 STITCH CRACK REPAIR COMPONENTS

A. Basis of Design Products: Provide products listed below as manufactured by Sika Corp, or provide equivalent products as supplied by Conproco or Mapei.
1. Epoxy Mortar: One to one mix of Sikadur 32, Hi-Mod. Product 770 and oven dried silica sand.
2. Crack Filler: Sikadur 52, Product 396.
3. Gel Type Crack Filler: Sikadur 31, High Mod Gel, Product 390.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Proceed with application only after unsatisfactory conditions have been corrected.

B. Conduct no less than 1 moisture vapor transmission rate tests per 1000 square feet.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.
   1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment and topping.
   2. Fill substrate voids to prevent underlayment and topping from leaking.
   3. Comply with manufacturer’s recommendations for scrubbing topping materials into surface and other preparations for topping.

B. Crack Repair: Chip away loose material at surface. Cracks shall be v-routed to a 1/2 inch depth and blown free of dust and debris with oil free compressed air. Gravity feed cracks with epoxy. Pour epoxy into joint until completely filled.

C. Stitch Crack Repair: Cut channel into concrete flooring and cracks to minimum width and depth indicated or as recommended by manufacturer for product specified. Blow out to remove dust and particles. Fill slot with epoxy mortar to top of slab. Between slots, prepare and fill crack as indicated above for Crack Repair. Reference Detail 3/A1.1a.

D. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
   1. Remove sufficient concrete adjacent to clean outs and floor drains to permit installation of topping or underlayment and floor finishes flush with clean out and floor drains.
   2. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

E. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment and topping according to manufacturer's written instructions.

3.3 APPLICATION

A. General: Mix and apply underlayment and topping components according to manufacturer's written instructions.
   1. Close areas to traffic during underlayment and topping application and for time period after application recommended in writing by manufacturer.
   2. Coordinate application of components to provide optimum underlayment and topping-to-substrate and intercoat adhesion.
   3. At substrate expansion, isolation, and other moving joints, provide crack isolation membrane as recommended by manufacturer.

B. Crack Repair Materials: Comply with manufacturer’s recommendations.

C. Apply primer over prepared substrate at manufacturer's recommended spreading rate.

D. Apply underlayment and topping to produce uniform, level surface, typically.
   1. Apply a final layer without aggregate to produce smooth surface.
   2. Feather edges to match adjacent floor elevations.

E. Apply trowel grade topping and wear course materials to areas indicated to receive a sloped finish.

F. Cure underlayment and topping according to manufacturer's written instructions. Prevent contamination during application and curing processes.

G. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.

H. Remove and replace underlayment and topping areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

B. Protect topping from concentrated and rolling loads for 28 days.

C. Apply no less than 2 coats of sealer at topped floors with no other finish.

END OF SECTION 03 54 16

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Brick.
4. Mortar and grout materials.
5. Reinforcement.
6. Ties and anchors.
7. Embedded flashing.
8. Accessories.
9. Mortar and grout mixes.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in unit masonry.
2. Steel lintels in unit masonry.
3. Cavity wall insulation adhered to masonry backup.

C. Related Requirements:

1. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
2. Division 07 Section "Thermal Insulation" for cavity wall insulation.
3. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.
4. Division 07 Section “Self-Adhered Sheet Waterproofing” for waterproofing applied to masonry walls.
5. Division 07 Section "Fire-Resistive Joint Systems” for fire-resistive joint system at heads of masonry walls.
6. Division 07 Section “Joint Sealants” for sealing control joints in unit masonry.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For the following:

1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Indicate bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315R. Indicate elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
4. Provide shop drawings in advance of concrete construction and prior to delivery of reinforcing steel to the site such that all of engineer's review comments can be addressed prior to fabrication and delivery of reinforcing steel.

C. Samples for Initial Selection:

1. Decorative CMUs, in the form of small-scale units.
2. Clay face brick, in the form of straps of five or more bricks.
3. Colored mortar.
4. Weep/cavity vents.

D. Samples for Verification: For each type and color of the following:

1. Decorative CMUs.
2. Clay face brick.
3. Special brick shapes.
4. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
5. Weep/cavity vents.
6. Cavity drainage material.
7. Accessories embedded in masonry.

1.5 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Material Certificates: For each type of the following:

1. Masonry units.

a. Include material test reports substantiating compliance with requirements.
b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
c. For exposed brick, include test report for efflorescence in accordance with ASTM C67.

d. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellent used in CMUs.
3. Cementitious materials. Include name of manufacturer, brand name, and type.
4. Mortar admixtures.
5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
6. Grout mixes. Include description of type and proportions of ingredients.
7. Reinforcing bars.
8. Joint reinforcement.
9. Anchors, ties, and metal accessories.

C. Qualification Statements: For testing agency.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109 for compressive strength, ASTM C1506 for water retention, and ASTM C91 for air content.
2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined in accordance with TMS 602.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

A. Qualifications:
1. Testing Agency Qualifications: Qualified in accordance with ASTM C1093 for testing indicated.

B. Source Limitations for New Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product required.

C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from a single manufacturer for each cementitious component and from one source or producer for each aggregate.

D. Mason Qualifications: Employ the highest skilled masonry craftsperson for laying feature walls. Mason shall have no less than 10 years experience in laying exposed masonry.

1.7 MOCKUPS

A. Sample Panel Mockups: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.

1. Build sample panels for typical exterior wall in sizes approximately 60 inches (1524 mm) long by 48 inches (1219 mm) high by full thickness.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Clean one-half of exposed faces of panels with masonry cleaner indicated.
5. Protect approved sample panels from the elements with weather-resistant membrane.
6. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

    a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

B. Wall Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution.

1. Build mockup as indicated on Drawings or if not indicated as outlined below and directed by architect.
2. Build mockups for typical exterior wall] in sizes approximately 60 inches (1524 mm long by 60 inches (1524 mm) high by full thickness, including face and backup wythes and accessories.

    a. Include a sealant-filled joint at least 16 inches (406 mm) long in exterior wall mockup.
    b. Include lower corner of window opening, with stone trim, at upper corner of exterior wall mockup. Make opening approximately 12 inches (305 mm) wide by 16 inches (406 mm) high.
    c. Include through-wall flashing installed for a 24-inch (610-mm) length in corner of exterior wall mockup approximately 16 inches (406 mm) down from top of mockup, with a 12-inch (305-mm) length of flashing left exposed to view (omit masonry above half of flashing).
    d. Include metal studs, sheathing, water-resistive barrier, sheathing joint-and-penetration treatment, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.

3. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
4. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
5. Protect accepted mockups from the elements with weather-resistant membrane.
6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations by Change Order.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches (610 mm) down both sides of walls, and hold cover securely in place.
2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (610 mm) down face next to unconstructed wythe, and hold cover in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Masonry to withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.

B. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) in accordance with TMS 602.

2.2 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, use the equivalent thickness method for masonry units in accordance with ACI 216.1.

2.3 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide square-edged units for outside corners unless indicated to be bull nose by plan designation “BN”.

B. Integral Water Repellent: Provide units made with integral water repellent for exterior exposed units and units in exterior walls and site walls.

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested in accordance with ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, will show no visible water or leaks on the back of test specimen.

    a. Products:
        1) Addiment Incorporated: Block Plus W-10
        2) Grace Construction Products, a unit of W.R. Grace & Co.; Dry-Block.
        3) Master Builders, Inc.; Rheopel.

C. CMUs: ASTM C90, normal weight, unless otherwise indicated.
1. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.
2. Exposed Faces: Smooth cast, no scores.

D. Decorative CMUs: ASTM C90, normal weight.

1. Basis-of-Design: See Exterior Finish Legend.
2. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph above.
3. Pattern and Texture: See Exterior Finish schedule.
4. Colors: As selected by Architect from manufacturer's full range.
5. Sealer: After installation and cleaning provide field applied sealer recommended by manufacturer to seal and enhance surface sheen and water repellant qualities.

2.4 LINTELS (Allowed where not exposed to view)

A. Solid Concrete Masonry Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength of not less than that of CMUs**.**

B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

C. Offset Angle Supports: Steel plate brackets anchored to structure, allowing continuous insulation behind shelf angle supporting veneer. Component and anchor size and spacing engineered by manufacturer.
1. Stainless Steel: ASTM A240 or ASTM A666, Type 304.

2.5 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes,

and lintels, requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing, and where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C216, Grade SW.
   1. Basis-of-Design Products: The following product shall be incorporated into the work upon approval of initial selection sample panel by Architect.
      a. Manufacturer/ Color/ Pattern: See Drawings.
   2. approval of initial selection sample panel by Architect
   3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi (23.10 MPa).
   4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested in accordance with ASTM C67/C67M.
   5. Efflorescence: Provide brick that has been tested in accordance with ASTM C67/C67M and is rated "not effloresced."
   6. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 8 inches (203 mm) long.
   7. Application: Use where brick is exposed unless otherwise indicated.

2.6 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

   1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Aggregate for Mortar: ASTM C144.

   1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
   2. For joints less than 1/4 inch (6.4 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
   3. White-Mortar Aggregates: Natural white sand or crushed white stone.
   4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

E. Aggregate for Grout: ASTM C404.

F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. BASF Corporation – Construction Chemicals
b. Euclid Chemical Company
c. GCP Applied Technologies Inc.

G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

H. Water: Potable.

2.7 REINFORCEMENT

A. Refer to Structural Drawings for details. If not indicated, confirm with Architect based off the following:

B. Uncoated-Steel Reinforcing Bars: ASTM A615, Grade 60.

C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hohmann & Barnard, Inc.; #RB or RB-Twin Rebar Positioner or a comparable product by one of the following:
   a. Heckmann Building Products, Inc.
   b. Lock Rite.
   c. Wire-Bond.

D. Masonry-Joint Reinforcement, General: ASTM A951.

1. Interior Walls: Hot-dip galvanized carbon steel.
2. Exterior Walls: Hot-dip galvanized carbon steel.
3. Wire Size for Side Rods: W1.7 or 0.148-inch (3.77-mm) diameter.
4. Wire Size for Cross Rods: W1.7 or 0.148-inch (3.77-mm) diameter.
5. Wire Size for Veneer Ties: W1.7 or 0.148-inch (3.77-mm) diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (406 mm) o.c.
7. Provide in lengths of not less than 10 ft. (3 m).
8. Products: Hohmann and Barnard: 220 Ladder Joint Reinforcing.

E. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

F. Masonry-Joint Reinforcement for Multiwythe Masonry:
1. Adjustable (two-piece) type, ladder design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch (1.6 mm) and maximum vertical adjustment of 1-1/4 inches (32 mm). Size ties to extend at least halfway through facing wythe but with at least 5/8-inch (16-mm) cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.
2. Products:
   a. Hohmann and Barnard: 270-2X Ladder Eye-Wire and Pintel.

3. Contractor's Option: Provide single-wythe wall reinforcing for CMU back up course and separately attached wall ties as specified below.

2.8 TIES AND ANCHORS

A. General: Ties and anchors extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
1. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 (Z180) zinc coating.
2. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.

1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches (51 mm) long for masonry constructed from solid units.
2. Where wythes do not align or are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches (32 mm).
3. Wire: Fabricate from 3/16-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire.

D. Anchors for Connecting to Structural Steel: As specified on structural drawings.

E. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (10-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
1. Where clearances do not permit use of a plate and tube, provide two angles, secured to deck or structure above, one on each side of wall. Angles shall be 5 by 3 by ¼ inch.

F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.4 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153.

G. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a 100 lbf (445 N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.6 mm).
2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.0785-inch- (1.99-mm-) thick steel sheet, galvanized after fabrication.
3. Fabricate wire ties from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire unless otherwise indicated.

4. Masonry-Veneer Anchors; Slotted Plate: Sheet metal anchor section, with screw holes at top and bottom; and raised rib-stiffened strap, stamped into center to provide a slot between strap and base for wire tie.

a. Basis-of-Design Product: Hohmann & Barnard, Inc., HB-213-2X for steel studs.

b. Alternate: Hohmann & Barnard, Inc., HB-5213 for CMU back-up walls.

5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 (4.83 mm) diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours in accordance with ASTM B117.
6. Post-installed Anchors: Provide chemical or torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
   a. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).

H. Structural Steel Column Anchors:
1. Weld-on Masonry Ties: Basis of deign product: Hohmann and Barnard, Inc., 359 Weld on Column anchor with VBT wire tie.

2.9 EMBEDDED FLASHING

A. Metal Flashing: Through wall flashing, custom formed concealed stainless steel flashing, reglets and counterflashing as specified in Division 07 Section “Sheet Metal Flashing and Trim”.

B. Flexible Flashing: For flashing partly exposed to the exterior or in masonry courses immediately above cast stone, use metal flashing specified above. For flashing not exposed to the exterior, use the following:

1. Stainless Steel Fabric Flashing: Composite, flashing product consisting of 2-mil (0.05-mm) of Type 304 stainless steel sheet, bonded to a layer of polymeric fabric, to produce an overall thickness of 40-mil (1.0-mm).

   a. Products: Subject to compliance with requirements, provide one of the following or an equal product approved by the architect:
      1) York Manufacturing, Inc.: Multi-Flash SS
      2) Hohmann & Barnard, Inc.: Mighty-Flash Stainless Steel Composite

C. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
2. Elastomeric Sealant: ASTM C920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

E. Termination Bars for Flexible Flashing: Provide flexible flashing manufacturer's recommended termination bars fabricated from Stainless steel.

2.10 ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
1. Preformed control joint gasket: Basis of design: Hohmann and Barnard, RS Series.
2. Slip set Stabilizer- Style H.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vents: Use the following unless otherwise indicated:
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3.2 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

a. Products:
1) Advanced Building Products Inc.; Mortar Maze weep vent.
2) Heckmann Building Products Inc.; No. 85 Cell Vent.
3) Hohmann & Barnard, Inc.; Quadro-Vent.
4) Wire-Bond; Cell Vent.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Mortar Deflector: Strips, full depth of cavity and 10 inches (254 mm) high, with dovetail-shaped notches that prevent clogging with mortar droppings.

a. Basis-of-Design Product: Mortar Net USA, Ltd.; Mortar Net with Insect Barrier

F. Proprietary Acidic Masonry Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

1. Basis-of-Design Product: Prosoco, Sure Klean 600, New masonry cleaner.

2.11 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.

2. Use portland cement-lime, masonry cement, or mortar cement mortar unless otherwise indicated.
3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type N.
4. For exterior, above-grade, load-bearing, nonload-bearing walls, and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.

1. For mineral-oxide pigments do not exceed 10 percent of portland cement by weight.
2. For Carbon-black pigments do not exceed 5 percent of masonry cement or mortar cement by weight.
3. Application: Use pigmented mortar for exposed mortar joints with the following units:
   a. Decorative CMUs.
   b. Face brick.

E. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602 for dimensions of grout spaces and pour height.
2. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured in accordance with ASTM C143/C143M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (13 mm) or minus 1/4 inch (6.4 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (13 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6.4 mm) in a story height or 1/2 inch (13 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.

4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 ft. (3.2 mm in 3 m), 1/4 inch in 20 ft. (6.4 mm in 6 m), or 1/2-inch (13-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), 3/8 inch in 20 ft. (10 mm in 6 m), or 1/2-inch (13-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 ft. (6.4 mm in 3 m), or 1/2-inch (13-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.6 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (102-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches (102 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (102-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (610 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors, and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1219 mm) o.c. unless otherwise indicated.

3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.

E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

F. Cut joints flush where indicated to receive waterproofing, cavity wall insulation, or air barriers unless otherwise indicated.

3.6 COMPOSITE MASONRY

A. Bond wythes of composite masonry together as follows:

1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement.

B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.

1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are indicated at juncture, bond walls together as follows:

1. Provide individual metal ties not more than 8 inches (203 mm) o.c.
2. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.
3. Provide rigid metal anchors not more than 24 inches (610 mm) o.c. If used with hollow masonry units, embed ends in mortar-filled cores.

3.7 CAVITY WALLS

A. Bond wythes of cavity walls together as follows:

1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.

a. Where bed joints of both wythes align, use tab-type reinforcement.
b. Where one wythe is of clay masonry and the other of concrete masonry and do not align, use adjustable (three-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align or separate wall anchors with single wythe reinforcing.
c. When three-piece type reinforcing is employed, do not pierce wall flashing with vertical rod. Where rod is discontinued above the through wall flashing, bend rod at bottom end so that rod cannot pierce flashing.

B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

C. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches (305 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as indicated.

1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.8 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and or concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.

2. Embed tie sections in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 16 inches (406 mm) o.c. vertically and horizontally. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

B. Provide not less than 2 inches (51 mm) of airspace between back of masonry veneer and face of insulation.

1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.9 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (152 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.10 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
1. Install masonry control joints at 24 feet on center maximum in exterior walls, and 30 feet on center maximum in interior walls when joints are not indicated on plans.
2. Utilize existing control joint locations where they occur.

B. Form control joints in concrete masonry as follows:
1. Install preformed control-joint gaskets designed to fit standard sash block.

C. Form expansion joints in brick as follows:
1. Build in compressible joint fillers where indicated.
2. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch (10 mm) for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

D. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch (10 mm).

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.11 LINTELS

A. Install steel lintels where indicated.

B. Provide masonry and or offset angle support lintels where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are indicated without structural steel or other supporting lintels.

C. Provide minimum bearing of 8 inches (203 mm) at each jamb unless otherwise indicated.

3.12 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches (102 mm), and 1-1/2 inches (38 mm) into the inner wythe.
3. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (203 mm); with upper edge tucked under water-resistive barrier, lapping at least 4 inches (102 mm). Fasten upper edge of flexible flashing to sheathing through termination bar**.**
4. At lintels and shelf angles, extend flashing 6 inches (152 mm) minimum at each end. At heads and sills, extend flashing 6 inches (152 mm) minimum and turn ends up not less than 2 inches (51 mm) to form end dams.
5. Interlock end joints of sawtooth sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
6. Install metal drip edges with sawtooth sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall.

Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are indicated to be built into masonry.
   1. At existing Masonry: Grind mortar out of head joint of course shown. Insert reglet, wedge in place with lead or plastic shims and pack in grout of same color and type as existing. Tool joint to match existing.

E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

   1. Use specified weep/cavity vent products to form weep holes.
   2. Space weep holes 24 inches (610 mm) o.c. unless otherwise indicated.

F. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Accessories" Article.

3.13 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

   1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
   2. Limit height of vertical grout pours to not more than 60 inches (1524 mm).

3.14 PATCHING MASONRY

A. Where existing brick or concrete masonry is indicated to be patched, remove full damaged units to next mortar joint. Remove full units.

B. Use salvaged brick when patching existing brick masonry. Match mortar color and bed thickness.

C. Where demolition exposes damaged or cut units, tooth in new CMU to provide full undamaged or cut units.

D. Use same mortar as specified for new construction. Modify mortar mix to match existing masonry mortar appearance. Point mortar to match existing to eliminate evidence of repair.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements will be at Contractor's expense.

B. Inspections: Special inspections in accordance with Level 2 in TMS 402 unless designated as an essential facility.
   1. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

C. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

D. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

F. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

G. See structural drawings for additional inspection requirements.

3.16 PARGING

A. Parge exterior faces of:
   1. Below-grade masonry walls to receive waterproofing.
   2. Above grade masonry to receive air barrier membrane.
   3. Above grade to receive ceramic tile.

B. Parge interior faces of masonry to receive laminate gypsum wall board, backer board or cement board.

C. Parge masonry in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.
   1. Parge masonry to receive ceramic tile in 1 uniform coat of 3/8 inch unless filling or leveling of the wall is required in which case provide necessary coats and thickness to level wall.

D. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3.2 mm per 305 mm). Form a wash at top of parging and a cove at bottom.

E. Damp-cure parging for at least 24 hours and protect parging until cured.

F. For masonry to receive waterproofing form a wash at top of parging and a cove at bottom.

1. Damp- cure parging for at least 24 hours and protect parging until cured.

3.17 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic masonry cleaner applied according to manufacturer's written instructions.

3.18 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 20 00

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shrinkage-resistant grout.

B. Related Requirements:

1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Steel Decking" for field installation of shear stud connectors through deck.
3. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
4. Division 09 painting Sections for surface-preparation and priming requirements.

1.2 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Shear stud connectors.
4. Anchor rods.
5. Threaded rods.
6. Forged-steel hardware.
7. Shop primer.
8. Galvanized-steel primer.
9. Etching cleaner.

10. Galvanized repair paint.
11. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Mill test reports for structural-steel materials, including chemical and physical properties.

C. Source quality-control reports.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).

B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

B. Connection Design Information:

1. Option 1: Connection designs have been completed and connections indicated on the Drawings.

C. Moment Connections: Type FR, fully restrained.

D. Construction: Moment frame.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A992.

B. Channels, Angles: ASTM A36.

C. Plate and Bar: ASTM A36.

D. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B structural tubing.

E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1 (Type 8.8-1), compressible-washer type with plain finish.

B. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436, Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating.
2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1 (Type 8.8-1), compressible-washer type with mechanically deposited zinc coating finish.

C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F1852, Type 1, heavy-hex or round head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.

1. Finish: Plain.

2.4 RODS

A. Unheaded Anchor Rods: ASTM F1554, Grade 36.

1. Configuration: Hooked.
2. Finish: Plain (interior locations), Hot-dip zinc coating, ASTM A153/A153M, Class C (exterior locations).

2.5 PRIMER

A. Steel Primer:
   1. SSPC-Paint 23, latex primer.

2.6 SHRINKAGE-RESISTANT GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

2.8 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

   1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123.

   1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.10 SHOP PRIMING

A. Shop prime steel surfaces, except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.

B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
1. SSPC-SP 3.

C. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.11 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E165.
b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
c. Ultrasonic Inspection: ASTM E164.
d. Radiographic Inspection: ASTM E94.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.

B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.

C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened for anchor bolts, Pretensioned for non-movement connections, and Slip critical for moment connections.

B. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.

a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1 and the following inspection procedures, at testing agency's option:

1) Liquid Penetrant Inspection: ASTM E165/E165M.
2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3) Ultrasonic Inspection: ASTM E164.
4) Radiographic Inspection: ASTM E94.

END OF SECTION 05 12 00

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.

B. Related Requirements:

1. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
2. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Roof deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

a. Power-actuated mechanical fasteners.
b. Acoustical roof deck.

2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

E. Qualification Statements: For welding personnel and testing agency.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding codes:

1. AWS D1.1.
2. AWS D1.3.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store products in accordance with SDI MOC3. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.2 ROOF DECK

A. Basis of Design Manufacturers: Provide products of one of the following in accordance with the referenced specifications herein.
1. Canam Steel Corp.
2. CMC Joist and Deck - Manufacturers of United Steel Deck Products.
3. Vulcraft, Division of Nucor Corp.
4. Verco Decking, Inc. - A Nucor Company.
5. Wheeling-Pittsburgh Steel Corp, Division of Wheeling Corrugating Co.

B. Fabrication of Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:
   1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40, 50 or 80 with minimum yield strength of 40,000 psi, G90 zinc coating.
   2. Deck Profile: Type B.
   3. Profile Depth: 1-1/2 inches.
   4. Design Uncoated-Steel Thickness: 22 gage (0.0295 inches).
   5. Span Condition: Three spans minimum, unless otherwise indicated.
   6. Side Laps: Overlapped or interlocking seam at Contractor's option.
   7. Where nesting new deck on top of existing deck, verify profile of existing deck and match existing deck profile with new roof deck.

2.3 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Galvanizing Repair Paint: ASTM A780/A780M.

H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

A. Fasten roof-deck panels to steel supporting members by arc #12 screws and as follows:

1. Screw size: #12.
2. Screw Spacing: Screw edge and interior ribs of deck units with a 36/7 screw pattern per deck unit at each support.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 12 inches, and as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.
2. Mechanically clinch or button punch.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.

3.4 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Special inspections and qualification of welding special inspectors for cold-formed steel floor and roof deck in accordance with quality-assurance inspection requirements of SDI QA/QC.

a. Field welds will be subject to inspection.

2. Steel decking will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Exterior non-load-bearing wall framing.
      a. Work includes exterior walls, roof, soffits and fascias.
         1) Framing for roof and soffits shall be no less than 16 gage in thickness, 4 inches in depth and at 16 inches on center.
   2. Any partition indicated on plans with a thickness greater than 20 gauge**.**
   3. Any interior partition greater than 10 feet in height.

B. Related Sections include the following:
   1. Division 05 Section "Metal Fabrications" for masonry connections.
   2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal, roof, stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
   1. Design Loads: As indicated on structural drawings
      a. Dead Loads: 15 psf for metal stud walls sheathed on both faces.
   2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
      a. Exterior Non-Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height.
   3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
   4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
      a. Upward and downward movement of 1 inch.

C. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
   1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
   2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

1.4 SUBMITTALS

A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Delegated Design Submittal: For cold-formed steel walls, roofs and soffits.
1. Including connectors.

D. Welding certificates.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

F. Qualification Data: For professional engineer.

G. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

H. Research/Evaluation Reports: For cold-formed metal framing.

1.5 QUALITY ASSURANCE

A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.

B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.

D. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
1. AllSteel Products, Inc.
2. Clark Steel Framing.
3. Consolidated Fabricators Corp.; Building Products Division.
4. Dale/Incor.
5. Dietrich Metal Framing; a Worthington Industries Company.
6. Formetal Co. Inc. (The).
7. MarinoWare; a division of Ware Industries.
8. Southeastern Stud & Components, Inc.
9. Steel Construction Systems.
10. Super Stud Building Products, Inc.
11. United Metal Products, Inc.

2.2 MATERIALS

A. Steel Sheet for all galvanized studs, and accessories: ASTM A1003 or A653, as applicable, Structural Grade, metallic coated, of grade and coating weight as follows:
1. Yield Stress: 33 ksi for 18 ga. or lighter and 50 ksi for 16 ga. or heavier.
2. Coating: G60 for metal studs and tracks, G90 for clips and accessories.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:
1. Grade: As required by structural performance.

2. Coating: G90.

2.3 NON-LOAD-BEARING WALL, ROOF AND SOFFITFRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0538 inch (16 gage).
2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches

C. This section applies to metal studs loaded by wind, including rafters, soffits, and interior partitions of height exceeding 10 feet.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 653, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
   1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
   1. Fabricate framing assemblies using jigs or templates.
   2. Cut framing members by sawing or shearing; do not torch cut.
   3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
   4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
   1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
   1. Cut framing members by sawing or shearing; do not torch cut.
   2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
      a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
      b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
   1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
   1. Anchor Spacing: 32 inches maximum.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks, unless otherwise noted. Space studs as follows:
   1. Stud Spacing: 16 inches maximum.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
   1. Install single deep-leg deflection tracks and anchor to building structure.
   2. Install double deep-leg deflection tracks and anchor outer track to building structure.
   3. Connect vertical deflection clips to infill studs and anchor to building structure.
   4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches (1220 mm) apart. Fasten at each stud intersection.
   1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
   2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches (305 mm) of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
   1. Install solid blocking at 96-inch (2440-mm) centers.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable roof, soffit and wall-framing system

H. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

I. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
   1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
   2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

J. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
   1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

K. Install horizontal bridging in stud system, spaced as indicated on Shop Drawings. Fasten at each stud intersection.
   1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to 6 inches deep.
   2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
   3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

L. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

M. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable roof, soffit and wall-framing system.

3.5 FIELD QUALITY CONTROL

A. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor, Construction Manager, and Architect.

D. Remove and replace work where test results indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 054400 - COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Sections.

1.2 SUMMARY

A. Section Includes:

1. Roof trusses.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel truss materials.
2. Anchor bolts.
3. Post-installed anchors.
4. Power-actuated fasteners.
5. Mechanical fasteners.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated Design Submittal: For cold-formed steel trusses.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product test reports.

C. Research Reports: For post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Product Tests: Mill certificates or data from a qualified independent testing agency.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Aegis Metal Framing.
2. Marino\ WARE.
3. TrusStreel; an ITW Company.
4. USA Frametek.
5. WESTCO Steel Systems, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel trusses.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:
   a. Roof Trusses: Vertical deflection of 1/240 (Dead Load) and 1/360 (Live Load) of the span.

3. Design trusses to provide for movement of truss members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).

C. Cold-Formed Steel Truss Standards: Unless more stringent requirements are indicated, trusses comply with the following:

1. Floor and Roof Systems: AISI S210.

2. Lateral Design: AISI S213.
3. Roof Trusses: AISI S214.

D. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 COLD-FORMED STEEL TRUSS MATERIALS

A. Steel Sheet: ASTM A1003, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60 (Z180).

2.4 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.

1. Connecting Flange Width: 1-5/8 inches (41 mm), minimum at top and bottom chords connecting to sheathing or other directly fastened construction.
2. Minimum Base-Metal Thickness: 18-gauge.

2.5 TRUSS ACCESSORIES

A. Fabricate steel-truss accessories from steel sheet, ASTM A1003, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for truss members.

B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel headless, hooked bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel trusses to structure.
2. Type: Torque-controlled expansion anchor or adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.

4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).

D. Power-Actuated Fasteners: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M.

B. Shims: Load-bearing, high-density multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as truss members supported by shims.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install bridge, and brace cold-formed steel trusses according to AISI S200, AISI S202, AISI S214, and manufacturer's written instructions unless more stringent requirements are indicated.

1. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure.
2. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's Technical Note 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses.".

B. Install cold-formed steel trusses and accessories true to line and location, and with connections securely fastened.

C. Install temporary bracing and supports to secure trusses and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to trusses are secured.

D. Truss Spacing: 24 inches (610 mm) unless indicated otherwise on drawings.

3.2 ERECTION TOLERANCES

A. Install cold-formed steel trusses level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error are not to exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel trusses with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform inspections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Cold-formed metal trusses will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 054400

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Metal bollards.
2. Loose bearing and leveling plates for applications where they are not specified in other Sections.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Loose lintels.
5. Steel framing and supports for mechanical and electrical equipment.

B. Products furnished, but not installed, under this Section:
1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Sections:
1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Division 04 Section "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
3. Division 05 Section "Structural Steel Framing."
4. Division 05 Section "Pipe and Tube Railings."

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria as required by the prevailing building codes.

B. Ladders, Fixed, Safety Requirements: Fabricate and label ladders to comply with the following:
1. ANSI A14.3.
2. OSHA 1910.27

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

A. Product Data: For the following:
1. Bollard covers.
2. Nonslip aggregates and nonslip-aggregate surface finishes.
3. Grout.

B. Shop Drawings: Show fabrication and installation details for metal fabrications.
1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Qualification Data: For qualified professional engineer.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

B. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D.

C. Wide-flange steel shapes: ASTM A992.

D. Steel Tubing: ASTM A 500, cold-formed steel tubing.

E. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
1. Provide heavy weight (Schedule 80) for bollards.

F. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
1. Size of Channels: 1-5/8 by 1-5/8 inches.
2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; 0.108-inch (12 gage) nominal thickness.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

D. Eyebolts: ASTM A 489.

E. Machine Screws: ASME B18.6.3.

F. Lag Screws: ASME B18.2.1.

G. Wood Screws: Flat head, ASME B18.6.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1.

J. Chain: Heat treated alloy steel chain, ASTM A413, Grade 100, 3/8 inch, hot dipped galvanized.
   1. S-hooks: Zinc plated S-hook sized for chain.

K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

M. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
   1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
   2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

N. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Shop Primers: Provide primers that comply with Division 09 painting Sections.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
   1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
   1. Fabricate units from slotted channel framing where indicated.
   2. Furnish inserts for units installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where partially or wholly in the exterior wall and where exposed on the exterior of the building

D. Prime miscellaneous framing and supports with primer specified in Division 09 Section "Painting" where indicated.

2.7 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 80 steel pipe.

B. Hot dip galvanize bollards.

C. Provide bollard covers at all locations:
1. Basis of design: Post Guard, Flat Top Bollard Covers or equal
2. Size: See drawings
3. Color: TBD, final color to be selected from upgraded color section

2.8 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize exterior miscellaneous steel trim and sump pit cover.

D. Prime interior miscellaneous steel trim with primer specified in Division 09 Section "Painting."

2.9 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates.

2.10 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches unless otherwise indicated.

C. Galvanize entire loose steel lintel assemblies located in, or supporting exterior walls.

D. Prime loose steel lintels located in interior walls with primer specified in Division 09 Section "Painting."

2.11 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.12 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish metal fabrications after assembly.

C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.13 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
1. Shop prime with primers specified in Division 09 painting Sections unless indicated.

C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.
   2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for miscellaneous items securely to and rigidly brace from building structure.

3.3 INSTALLING METAL BOLLARDS

A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
   1. Fill bollard with concrete.
   2. Follow bollard cover instructions for installation. Trim to fit if required.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
   2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
   1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Stainless steel railings.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Bituminous paint.
   2. Nonshrink, nonmetallic grout.
   3. Anchoring cement.
   4. Metal finishes.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For each type of exposed finish.

D. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For delegated design professional engineer.

B. Welding certificates.

1.4 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
   1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.

B. Structural Performance: Railings, including attachment to building construction, withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
b. Infill load and other loads need not be assumed to act concurrently.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.3 STAINLESS STEEL RAILINGS

A. Tubing: ASTM A554, Grade MT 316L.

B. Pipe: ASTM A312/A312M, Grade TP 316L.

C. Castings: ASTM A743/A743M, Grade CF 8M or CF 3M.

D. Plate and Sheet: ASTM A240/A240M or ASTM A666, Type 316L.

2.4 FASTENERS

A. Fastener Materials:
1. Hot-Dip Galvanized Railing Components: Type 304 stainless steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329/F2329M for zinc coating.
2. Stainless Steel Railing Components: Type 316 stainless steel fasteners.

B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.

1. For stainless steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint, complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately.

1. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated.
2. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove flux immediately.
4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

E. Form changes in direction as follows:
1. By bending or by inserting prefabricated elbow fittings.

F. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

G. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.

H. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

I. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.

1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
2. Coordinate anchorage devices with supporting structure.

J. For railing posts set in concrete, provide stainless steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

2.7 STAINLESS STEEL FINISHES

A. Stainless Steel Pipe and Tubing Finishes:

1. 180-Grit Polished Finish: Uniform, directionally textured finish.

B. Stainless Steel Sheet and Plate Finishes:

1. Directional Satin Finish: ASTM A480/A480, No. 4.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Perform cutting, drilling, and fitting required for installing railings.

1. Fit exposed connections together to form tight, hairline joints.
2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
5. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 ANCHORING POSTS

A. Use stainless steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members.

3.3 CLEANING

A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 055213

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Rooftop equipment bases and support curbs.
2. Wood blocking, cants, and nailers.
3. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of process and factory-fabricated product.
2. For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Post-installed anchors.
5. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing

agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. Dimension Lumber: 19 percent unless otherwise indicated.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATMENT

A. General: Where fire-retardant-treated materials are indicated, materials are to comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat items indicated on Drawings, and the following:
1. Concealed blocking.
2. Framing for non-load-bearing partitions.
3. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.

2.5 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.6 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.

1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

2.7 MISCELLANEOUS MATERIALS

A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

D. Do not splice structural members between supports unless otherwise indicated.

E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

F. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. ICC-ES evaluation report for fastener.

END OF SECTION 06 10 00

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Sheathing joint-and-penetration treatment materials.

B. Related Requirements:

1. Division 06 "Rough Carpentry" for plywood backing panels.
2. Division 07 "Fluid-Applied-Membrane-Air-Barriers" for water-resistive barrier applied over wall and parapet sheathing.
3. Division 07 “Ethelene Propylene Diene Monomer Roofing” for roofing applied over roof sheathing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier and water-resistant glass-mat gypsum sheathing requirements and installation, special details, transitions, mockups, air-leakage testing, protection, and work scheduling that covers air-barrier and water-resistant glass-mat gypsum sheathing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency in accordance with ASTM D5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier and water-resistant glass-mat gypsum sheathing assemblies.

1. Show locations and extent of sheathing, accessories, and assemblies specific to Project conditions.
2. Include details for sheathing joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: From air-barrier and water-resistant glass-mat gypsum sheathing manufacturer, certifying compatibility of sheathing accessory materials with Project materials that connect to or that come in contact with the sheathing.

B. Product Test Reports: For each air-barrier and water-resistant glass-mat gypsum sheathing assembly, indicating compliance with specified requirements, for tests performed by a qualified testing agency.

C. Evaluation Reports: For the following, from ICC-ES:
1. Air-barrier and water-resistant glass-mat gypsum sheathing.

D. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer of air-barrier and water-resistant glass-mat gypsum sheathing.

B. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly**,** 150 sq. ft. (14 sq. m), incorporating backup wall construction, window, storefront, door frame and sill, ties and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.

    a. Coordinate construction of mockups to permit inspection and testing of sheathing before external insulation and cladding are installed.
    b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
    c. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.

2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Testing Agency Qualifications:
1. For testing and inspecting agency providing tests and inspections related to air-barrier and water-resistant glass-mat gypsum sheathing: an independent agency, qualified in accordance with ASTM E329 for testing indicated, and certified by Air Barrier Association of America, Inc.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Air-Barrier and Water-Resistant Glass-Mat Gypsum Sheathing Performance: Air-barrier and water-resistant glass-mat gypsum sheathing assembly, and seals with adjacent construction, are to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies are to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing , tie-ins to other installed air barriers, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.2 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated

weathering in accordance with ASTM D2898. Use for exterior and interior locations and where indicated.

3. Design Value Adjustment Factors: Treated lumber plywood is to be tested in accordance with ASTM D5516 and design value adjustment factors are to be calculated in accordance with ASTM D6305. Span ratings after treatment are to be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat all plywood unless otherwise indicated.

2.4 WALL SHEATHING

A. Glass-Mat Gypsum Sheathing, Walls: ASTM C1177/C1177M.

1. Product: Subject to compliance with requirements, provide the following or equal.
   a. DensGlass Sheathing by Georgia Pacific Building Products.
   b. Securock Brand UltraLight Glass-Mat Sheathing by USG Corporation.
2. Type and Thickness: Type X, 5/8 inch (15.0 mm) thick.
3. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.5 ROOF SHEATHING

A. Plywood Sheathing: DOC PS 1, Exterior, Structural I sheathing.

1. Span Rating: Not less than 24/0.
2. Nominal Thickness: Not less than 23/32 inch (17.85 mm).

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof parapet and wall sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Sheathing to Wood Framing: ASTM C1002.

E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
   1. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.

G. Screws for Fastening Composite Nail Base Insulated Roof Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours in accordance with ASTM B117. Provide washers or plates if recommended by sheathing manufacturer.

2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

   1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

   1. Table 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
   2. ICC-ES evaluation report for fastener.

D. Coordinate wall, parapet and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 INSTALLATION OF WOOD STRUCTURAL PANEL

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

a. Nail to wood framing.
b. Screw to cold-formed metal framing.
c. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 INSTALLATION OF GYPSUM SHEATHING

A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of panels.

D. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 061600

SECTION 06 41 16 - PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Plastic-laminate countertops

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.2 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or manufacturer's standard size.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For the following:

1. Plastic Laminates (High Pressure Laminate (HPL)): 8 by 10 inches for each type, color, pattern, and surface finish required.

a. Provide one sample applied to core material with specified edge material applied to one edge – 3mm Solid PVC Edgebanding

2. Thermally Fused Laminate (TFL) Panels: 8 by 10 inches for each color, pattern, and surface finish.

3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Product Certificates: For each type of product.

1. Composite wood products.
2. Thermally fused laminate panels.
3. High-pressure decorative laminate.
4. Adhesives.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacture is required to be in the AWI's Quality Certification Program, however project is not required to be certified.

B. Installer Qualifications: Manufacturer of products

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

A. Environmental Limitations without Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. ACS – Advanced Cabinet Systems
2. AMC - American Millwork & Cabinetry, Inc.
3. Mastercraft Woodworking Company, Inc.

2.2 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

B. Architectural Woodwork Standards Grade: Custom

C. Type of Construction: Frameless.

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
1. If specific product is not listed in drawings, then products to be selected from “Standard HPL” full range of product options from the following manuf.:
   a. Wilsonart
   b. Formica
   c. Arborite

F. Laminate Cladding for Exposed Surfaces:
1. Horizontal Surfaces: Grade HGS
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS
4. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish
5. Pattern Direction: Vertically for doors and fixed panels, horizontally for drawer fronts

G. Materials for Semiexposed Surfaces:
   1. Surfaces Other Than Drawer Bodies: Thermally fused laminate panels.
      a. Edges of Thermally Fused Laminate Panel Shelves: PVC or polyester edge banding.
   2. Drawer Sides and Backs: Solid-hardwood lumber
   3. Drawer Bottoms: Hardwood plywood

H. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

   1. Join subfronts, backs, and sides with [glued rabbeted joints supplemented by mechanical fasteners] [or] [glued dovetail joints].

J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
   1. Refer to Interior Finish Legend & Room Schedule in drawings.
   2. If not indicated in drawings, material to be selected by Architect from laminate manufacturer's full range in the following categories:
      a. Standard HPL Finish

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

   1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.
   1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130
   2. Particleboard (Medium Density): ANSI A208.1, Grade M-2
   3. Thermally Fused Laminate (TFL) Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.4 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products in accordance with test method indicated by a qualified testing agency.

   1. Use treated materials that comply with requirements of referenced quality standard. Do not use materials that are warped, discolored, or otherwise defective.
   2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.

3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of architectural cabinets.

2.5 CABINET HARDWARE AND ACCESSORIES

A. Hardware, General: Provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware complying with requirements indicated.
1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Finish:
1. Exposed Hardware:
   a. Stainless Steel, Type 304, Directional Satin, No. 4
2. Interior Hardware (slides, catches and adjustable shelves): Brushed Aluminum
   a. Provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

C. Hinges:
1. Standard hinges for wall cabinets, base cabinets and tall cabinet doors shall be of the heavy-duty, wrap around, institutional type with five knuckles, non-removable pin and rounded ends.
   a. Hinges for overlay door construction shall be 2-¾” high by .095” thick and hinges for lipped radius construction shall be 2-½” high by .072 thick.
   b. Hinge swing shall be 270 degrees.
   c. Hinges shall be finished in colors selected from the manufacturer’s standard colors.
   d. Hinge screws shall be concealed when door is closed.
2. The number of hinges shall vary according to the door height as follows:
   a. 10-½” – 34-½” door height: 2 hinges,
   b. over 34-½” – 52-½” door height: 3 hinges,
   c. over 52-½” – 70-½”: 4 hinges,
   d. over 70-½”: 5 hinges.

D. Pulls:
1. Wire Pull: 4 inch center-to-center Stainless Steel Pull, Back-Mounted, Solid Metal, Brushed Finish

E. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141

F. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081

G. Shelf Rests: ANSI/BHMA A156.9, B04013; metal

H. Drawer Slides: ANSI/BHMA A156.9.
   1. Heavy-Duty (Grade 1HD-100 and Grade 1HD-200): Side mount
      a. Type: Full extension.
      b. Material: Epoxy-coated polymer slides.
      c. Motion Feature: Soft close dampener
   2. Pencil drawers not more than 3 inches high and not more than 24 inches (600 mm) wide, provide 50 lb load capacity.
   3. General-purpose drawers more than 3 inches high, but not more than 6 inches high and not more than 18 inches wide, provide 100 lb load capacity.
   4. General-purpose drawers more than 6 inches high and more than 18 inches but not more than 30 inches wide, provide 150 lb load capacity.
      a. Basis of Design: Accuride – 3932EC (Easy-Close)
   5. Lateral file drawers more than 6 inches high and more than 30 inches wide but not more than 36 inches, provide 200 lb load capacity.
      a. Basis of Design: Accuride – 3600EC (Easy-Close), up to 36 inches wide

I. Cabinet Door and Drawer Locks: Cylindrical (cam) type, 5-pin tumbler, brass with chrome-plated finish or 6-tumbler diecast body with dead bolt engagement, complying with BHMA A156.11, Grade 1.
   1. Provide a minimum of two keys per lock and six master keys.
   2. Provide locks for all doors and drawers.
   3. Key locks in each room alike; masterkey locks for entire building to operate from a single master key.

J. Door Locks: ANSI/BHMA A156.11, E07121.

K. Drawer Locks: ANSI/BHMA A156.11, E07041.

L. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.

M. Clothes Rods: 1-5/16-inch-diameter, chrome-plated steel tubes.
   1. Rod Flanges: Aluminum.

N. Grommets for Cable Passage: 2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
   1. Color: (Standard color, coordinate with countertop finish.)

O. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for ANSI/BHMA finish number indicated.
   1. Satin Stainless Steel: ANSI/BHMA 630.

P. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

Q. Ceiling Mount Double Hooks: Dual steel hook with bulb safety ends, matte nickel finish, welded construction. Provide Stevens Advantage Hooks Gallery Collection Model SA-364MN. Product shall be attached to cabinet body with two number 10 screws with combined pullout strength of at least 400 pounds.

R. Wall Mount Hook: Dual steel hook with bulb safety ends, matte nickel finish, welded construction formed for coat and hat hooks. Provide Stevens Advantage Hooks Gallery Collection Model SA-363MN. Product shall be attached to cabinet body with two number 10 screws with combined pullout strength of at least 400 pounds.

2.6 COUNTERTOPS

A. Countertops, General:
1. Provide smooth, clean exposed tops and edges in uniform plane free of defects.
2. Provide front and end overhang of 1 inch over base cabinets.

B. Plastic-Laminate Tops:
1. Horizontal Surfaces: Grade HGS
2. Typical Countertop Thickness: 1 ¼”
3. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish

C. Plastic-Laminate Back & Side Splashes:
1. 4” high, unless noted otherwise
2. Match laminate of adjacent countertop, provide finish on exposed faces & edges of splash unit.

D. Countertop Support Brackets: L-shaped bracket formed from mitered and welded steel tubes punched for attachment holes for securing to wall and to countertop. Miter and close exposed end with steel plate, welded and ground smooth. Finish with powder coat paint system in white.
1. Tubes shall be 1-1/2 inch by 2-1/2 inch.
2. Surface mounted for concrete masonry walls, partially recessed mounted for steel stud construction.
3. Maximum countertop span: 42 inches between supports.

2.7 SHELVING

A. Plastic-Laminate Shelving: Plastic-laminate sheet, Type HGS or HGP, shop bonded with waterproof glue to both sides of particleboard. Sand surfaces to which plastic laminate is to be bonded.
1. Typical Shelf Thickness: 7/8 inch.
2. Edges: PVC edge banding, 3.0 mm thick, matching laminate in color, pattern, and finish

B. Adjustable Shelf Supports: Powder-coated steel standards and shelf brackets, complying with BHMA A156.9, Types B04102 and B04112, surface mounted.

2.8 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Adhesive for Bonding Plastic Laminate: Urea formaldehyde

1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.9 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of reinforcements, and other conditions affecting performance of institutional casework.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c.
    a. Toggle bolts through cells of concrete masonry;
    b. Or No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips;
    c. Or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
    d. Hanging strips may only be used when fully concealed at sides of cabinets.

3.4 INSTALLATION OF COUNTERTOPS

A. Field Jointing: Where possible make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
    1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.

B. Secure tops to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each front, end, and back.

C. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.

D. Secure backsplashes to tops with concealed metal brackets at 16 inches o.c. and walls with adhesive.

E. Seal junctures of top, splash, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.5 INSTALLATION OF SHELVES

A. Securely fasten adjustable shelf supports to partition framing, wood blocking, or reinforcements in partitions.

B. Install shelf standards plumb and at heights to align shelf brackets for level shelves. Install shelving level and straight, closely fitted to other work where indicated.

3.6 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

C. Clean, lubricate, and adjust hardware.

D. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 06 41 16

SECTION 066400 - PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For plastic paneling and trim accessories.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319.

1. Basis of Design: Basis-of-Design Product: Subject to compliance with requirements, provide Valto Engineered Materials, Glasbord or comparable product by one of the following:

a. Marlite Inc.
b. Nudo, A Verzatec Company.

2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency in accordance with ASTM E84. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: 25 or less. (Class A)
b. Smoke-Developed Index: 450 or less.

3. Nominal Thickness: Not less than 0.09 inch (2.3 mm).
4. Surface Finish: Molded pebble texture.
5. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, and caps as needed to conceal edges.

1. Color: Match panels.

B. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels and so that trimmed panels at corners are not less than 12 inches (300 mm) wide.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install trim accessories with adhesive.

C. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

D. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

E. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

SECTION 07 11 13 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes one of the following at Contractor's option, subject to environmental conditions and scheduling:
   1. Cold-applied, cut-back asphalt dampproofing.
   2. Cold-applied, emulsified-asphalt dampproofing.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 PROJECT CONDITIONS

A. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, CUT-BACK ASPHALT DAMPPROOFING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ChemMasters Corp.
   2. Degussa Building Systems; Sonneborn Brand Products.
   3. Henry Company.
   4. Karnak Corporation.
   5. Koppers Inc.
   6. Meadows, W. R., Inc.
   7. Tamms Industries, Inc.

B. Trowel Coats: ASTM D 4586, Type I, Class 1, fibered.

C. Brush and Spray Coats: ASTM D 4479, Type I, fibered.

D. VOC Content: 2.5 lb/gal. or less.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. ChemMasters Corp.
   2. Degussa Building Systems; Sonneborn Brand Products.
   3. Henry Company.
   4. Karnak Corporation.
   5. Koppers Inc.
   6. Meadows, W. R., Inc.
   7. Tamms Industries, Inc.

B. Trowel Coats: ASTM D 1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

E. VOC Content: 0.25 lb/gal. or less.

2.3 MISCELLANEOUS MATERIALS

A. Cut-Back Asphalt Primer: ASTM D 41.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.2 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.

B. Apply dampproofing to provide continuous plane of protection on bake side of CMU below grade where opposite face is exposed to view either on building interior or part of exterior site walls.

3.3 COLD-APPLIED, CUT-BACK ASPHALT DAMPPROOFING

A. On Steel Framing within Exterior Column Enclosures: Apply primer and 1 brush or spay coat at not less than 4 gal./100 sq. ft..

B. On Interior Face of Inner Wythe or Face of below grade CMU where opposite face or Wythe is above grade. Apply primer and 2 brush or spray coat at not less than 4 gal./ 100 sq.ft.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Steel Framing within Exterior Column Enclosures: Apply primer and 1 brush or spay coat at not less than 4 gal./100 sq. ft..

B. On Interior Face of Inner Wythe or Face of below grade CMU where opposite face or Wythe is above grade. Apply primer and 2 brush or spray coat at not less than 4 gal./ 100 sq.ft.

END OF SECTION 07 11 13

SECTION 07 13 26 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Modified bituminous sheet waterproofing.

B. Related Sections:
   1. Division 33 Section “Subdrainage” for molded sheet-drainage panels and conduction piping.

1.2 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.

D. Special warranties.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing required for this Project.

B. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.
   1. If Architect determines mockups do not comply with requirements, reapply waterproofing and reinstall overlying construction until mockups are approved.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

1.5 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Modified Bituminous Sheet: 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
      b. Grace, W. R. & Co.; Bituthene 3000.
      c. Henry Company; Blueskin WP 200.
      d. Meadows, W. R., Inc.; SealTight Mel-Rol.
      e. Nervastral, Inc.; BITU-MEM.
      f. Polyguard Products; Polyguard 650.
      g. Tamko Roofing Products, Inc.; TW-60.
   2. Physical Properties:
      a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
      b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
      c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
      d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
      e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
      f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
      g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
      h. Vapor Permeance: 0.05 perms; ASTM E 96, Water Method.

2.2 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
   1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.

G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

H. Metal Termination Bars: Aluminum bars, with beveled edges, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.

I. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
   1. Thickness: 1/8 inch, nominal.
   2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

2.3 MOLDED-SHEET DRAINAGE PANELS

A. As specified in Division 33 Section “Subdrainage”.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

F. Bridge and cover control joints with overlapping sheet strips.
   1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.2 APPLICATION

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

D. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

E. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
   1. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detailing tape.

F. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

3.3 FIELD QUALITY CONTROL

A. Where drainage course is not specifically accepted by waterproofing membrane manufacturer as adequate protection, install protection course with butted joints over waterproofing membrane immediately.

B. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

C. Engage a full-time site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions; surface preparation; membrane application, flashings, protection, and drainage components; and to furnish daily reports to Architect.

3.4 PROTECTION AND CLEANING

A. Do not permit foot or vehicular traffic on unprotected membrane.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Perimeter insulation under slabs-on-grade.
2. Perimeter wall insulation
3. Glass-fiber blanket insulation for Attic insulation between joists and trusses.
4. Expanding foam sealant for infiltration control.
5. Sound attenuation insulation.

B. Related Sections include the following:
1. Division 04 Section "Unit Masonry" for insulation installed in cavity walls.
2. Division 07 Sections "Ethylene-Propylene-Diene-Monomere (EPDM) Roofing" and" Thermoplastic Polyolefin (TPO) Roofing" for insulation specified as part of roofing construction.
3. Division 07 Section "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
4. Division 09 Section "Gypsum Board" for installation in metal-framed assemblies of insulation specified by referencing this Section.

1.3 DEFINITIONS

A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

B. Exposed Insulation: Insulation not fully concealed within construction and not in contact with noncombustible materials or where insulation facing will be exposed to ceiling plenums and cavities and other spaces above ceiling.

1.4 PERFORMANCE REQUIREMENTS

A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm air velocity.
2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with Chaetomium globosium on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: Full-size units for each type of exposed insulation indicated.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.

B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Surface-Burning Characteristics: ASTM E 84.
2. Fire-Resistance Ratings: ASTM E 119.
3. Combustion Characteristics: ASTM E 136.

1.8 PROJECT CONDITIONS

A. Sequencing and scheduling: Inspect for infiltration paths and install expanding foam sealant for infiltration control at the intervals indicated below. Do not enclose building envelope construction before inspecting and sealing infiltration paths.
1. Before installing veneer.
2. Before installing doors and windows.
3. Before installing interior wall finishes.
4. Before installing interior ceiling finishes

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect plastic insulation as follows:
1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
   1. Available Manufacturers:
      a. DiversiFoam Products.
      b. Owens Corning.
   2. Typical Applications:
      a. Type X, 15 psi
   3. High Strength Applications (below grade and where indicated):
      a. Type V, 100 psi compressive strength per ASTM D 1621.

2.3 CAVITY WALL INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for 1-inch thickness of 5.0 deg F x h x sq. ft./Btu at 75 deg F at 5 years; closed-cell product with a maximum flame spread and smoke-development index of 10 and 175, respectively.
   1. Provide Owens Corning “FOAMULAR NGX 250 Extruded Polystyrene Rigid Foam Insulation”.

B. Adhesive: Type recommended by insulation board manufacturer for application indicated.
   1. Where applied over weather barrier, provide adhesive compatible with weather barrier products.

2.4 GLASS-FIBER BLANKET INSULATION

A. Application: Insulation (concealed behind GWB), including above ceilings, where backside is concealed and where indicated.

B. Available Manufacturers:
   1. CertainTeed Corporation.
   2. Johns Manville.
   3. Knauf Fiber Glass.
   4. Owens Corning.

C. Foil-Faced, Fiberglass Insulation: ASTM C 612, Type IA or Types IA and IB; faced on 1 side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; and of the following nominal density and thermal resistivity:

1. Nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F. (Must achieve R49 at 16 inch thickness)

2.5 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BLANKET INSULATION

A. Application: Acoustic insulation.

B. Available Manufacturers:
1. Fibrex Insulations Inc.
2. Owens Corning.
3. Thermafiber.

C. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

2.6 EXPANDING FOAM SEALANT

A. Expanding Foam Sealant: Non shrinking, non drying, one-component expanding polyurethane foam sealant suitable for sealing infiltration pathways in building construction; VOC-compliant, with no CFC's or HCFC's; UL Listed, with Flame Spread of 25 or less and Smoke Density of 20 or less.
1. Available Products: Subject to compliance with requirements, provide one of the following:
a. Dow Chemical Company; Great Stuff Pro.
b. Geocel Corporation; Expanding Foam Sealant
c. Selena USA Inc., Tytan Products; One-Component Pro, Expanding Polyurethane Gun Foam Sealant.

2.7 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
1. Available Products:
a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
c. Gemco; Spindle Type.
2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
1. Available Products:
a. AGM Industries, Inc.; RC150.
b. AGM Industries, Inc.; SC150.
c. Gemco; Dome-Cap.
d. Gemco; R-150.
e. Gemco; S-150.

f. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
1. Available Products:
a. AGM Industries, Inc.; TACTOO Adhesive.
b. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
c. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

3.3 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.

C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION

A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

C. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.

D. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.

3.5 INSTALLATION OF GENERAL BUILDING INSULATION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Install board insulation on concrete and masonry substrates by adhesively attached, spindle-type insulation anchors as follows:
1. Fasten insulation anchors to concrete and concrete masonry substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
2. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
3. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
4. Apply manufacturers recommended tape to joints of insulation.

3.6 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 20 00 "Unit Masonry."

3.7 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
4. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.

C. Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

3.8 INSTALLATION OF INFILTRATION CONTROL SEALANT

A. General: Install expanding foam sealant at all infiltration pathways not blocked by other construction. Install at locations including, but not limited to, door frames, plumbing penetrations, tops and bottoms of frame walls, tops of masonry partitions, at flutes of steel decking, at steel beam cantilevers, wiring penetrations, and similar conditions.
1. Prepare and install materials according to manufacturer's recommendations.
2. Do not use expanding foam sealant for conditions where firestopping is indicated or required.

3.9 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 27 26 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes fluid-applied, vapor-permeable membrane air barriers.

B. Related Requirements:
1. Section 06 16 00 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.
1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
   1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
   1. Build integrated mockups of exterior wall assembly , 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
      a. Coordinate construction of mockups to permit inspection by testing agency of air barrier before external insulation and cladding are installed.
      b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
      c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Manufacturer’s Representative Quality Control: Manufacturer’s approved representative shall inspect the mock up and installed work and provide a written report to the Architect at the following frequency:
   1. At completion of the Mock Up. Provide recommendations for establishing the mock up for the standard of quality for the work.
   2. Inspect the substrates before the application of the air barrier.
   3. At any area with air barrier membrane before it is concealed. Review tie ins to other systems and penetrations through the system.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.
   1. Protect substrates from environmental conditions that affect air-barrier performance.

2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E 2357: Pass.

2.3 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Synthetic polymer membrane.
1. Basis of Design Products: Provide Henry Company; Air-Bloc 17MR (Use where concealed by exterior finish) Air-Bloc All Weather STPE (Use where exposed/ no finish under bleachers). Subject to compliance with requirements as established but the Basis of Design Product and subject to substation procedures, one of the following may be considered:
a. Synthetic Polymer Membrane:
1) Grace, W. R., & Co. - Conn.; Air-Shield LMP.
2) Tremco Incorporated, an RPM company; ExoAir 230.
2. Physical and Performance Properties:
a. Air Permeance: Maximum 0.0002 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
b. Vapor Permeance: Minimum 12.3 perms; ASTM E 96/E 96M.
c. Ultimate Elongation: Minimum 1000 percent; ASTM D 412, Die C.Fungal Growth: 0 rating -No fungal growth as tested to ASTM D 5590

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
1. Basis of Design Product: Henry Company; Aquatac.

C. Counterflashing and Transition Strip: Typical Applications.

1. Self-adhered, vapor permeable air barrier membrane for transition and joint treatment consisting of a microporous film laminate, backed with a specially applied adhesive, which allows water vapor to permeate through while acting as a barrier to air and rain water .
2. Basis of Design Product: Henry Company; Blueskin VP 160.

D. Counterflashing and Transition Strip: For use with Hot Asphalt Roofing.
1. Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, cross-laminated polyethylene film with release liner backing.
2. Basis of Design Product: Henry Company; Blueskin SA.

E. UV Resistant Coating: Vapor permeable UV resistant Coating.
1. Basis of Design Product: Henry Company, Air Block 33.

F. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.

G. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

H. Insulation Adhesive: Air-barrier manufacturer's standard insulation adhesive.
1. Basis of Design Adhesive for Insulation Product: Henry Company; Air-Bloc 21.

I. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

J. Termination Mastic: Air-barrier manufacturer's standard elastomeric liquid termination sealant.
1. Basis of Design Product: Henry Company; BES 925 Sealant.

K. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch thick, predrilled at 9-inch centers.
1. Edges: Provide beveled and flat edged termination bars in accordance with manufacturer’s recommended details.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
   1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of fluid air-barrier material and embed a joint reinforcing strip in preparation coat.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of fluid air-barrier material at joints. Tape joints with joint reinforcing strip after first layer is dry. Apply a second layer of fluid air-barrier material over joint reinforcing strip.

3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.
   1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane and compatibility of components.
   2. Install modified bituminous strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bitiminous transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.

G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, modified bituminous strip.

J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

L. Where air barrier membrane is not fully covered by other construction, coat the surface with UV resistant coating.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.
1. Apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
3. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
   1. Vapor-Permeable Membrane Air Barrier: Total wet film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 90-mil wet film thickness, applied in one or more equal coats.

C. Where recommended by manufacturer apply strip and transition strip over cured air-barrier material overlapping 3 inches onto each surface according to air-barrier manufacturer's written instructions.

D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: General Contractor shall engage a qualified testing agency to perform independent inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Continuous structural support of air-barrier system has been provided.
   3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
   4. Site conditions for application temperature and dryness of substrates have been maintained.
   5. Maximum exposure time of materials to UV deterioration has not been exceeded.
   6. Surfaces have been primed, if applicable.
   7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
   8. Termination mastic has been applied on cut edges.
   9. Strips and transition strips have been firmly adhered to substrate.
   10. Compatible materials have been used.
   11. Transitions at changes in direction and structural support at gaps have been provided.
   12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
   13. All penetrations have been sealed.

C. Air barriers will be considered defective if they do not pass tests and inspections.
   1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
   2. Remove and replace deficient air-barrier components for retesting as specified above.

D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
   1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days (or longer if recommended in writing by Manufacturer), remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
   2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 07 27 26

SECTION 074113.13 - FORMED METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam, metal roof and wall panels for existing pole building. [MP-2]

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.

C. Weathertight Warranty: Provide Standard 20 year limited weathertightness warranty as provided by manufacturer.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680 or ASTM E283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 or ASTM E331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 EXPOSED-FASTENER, LAP-SEAM, METAL ROOF/ WALL PANELS

A. Provide factory-formed metal roof & wall panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Tapered-Rib-Profile, Exposed-Fastener Metal Roof Panels **[MP-2]**: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced between major ribs.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide ATAS International, Inc.; Grand R Panel – BWG390 or comparable product by one of the following:
      a. Dimensional Metals, Inc.
      b. PAC-CLAD, Petersen by Carlisle Corporation
   2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

      a. Nominal Thickness: 24 gauge or 0.028 inch (0.71 mm).
      b. Exterior Finish: Two-coat fluoropolymer.
      c. Color: As selected by Architect from manufacturer's full range unless noed other wise on exterior finish legend on drawings.

   3. Major-Rib Spacing: 13 inches o.c.
   4. Panel Coverage: 39 inches.
   5. Panel Height: 1.5 inches.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
   3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are

not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
2. Joint Sealant: ASTM C920; as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.
2. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.2 INSTALLATION OF METAL ROOF & WALL PANELS

A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.
6. Watertight Installation:

    a. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
    b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
    c. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

B. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

C. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074113.13

SECTION 07 42 13.13 – FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Concealed-fastener, lap-seam metal wall and ceiling panels.

B. Related Sections:
1. Division 05 Section "Cold-Formed Metal Framing" for support framing, including girts, studs, and bracing.
2. Division 07 Sections “Thermal Insulation” and "Fluid-Applied Air Barrier Membranes" for rigid insulation continuous air barrier substrates.
3. Division 07 Section "Composite Wall Panels" for metal-faced composite wall panels.
4. Division 07 Section "Sheet Metal Flashing and Trim" for flashing and other sheet metal work that is not part of metal wall panel assemblies.

1.3 DEFINITION

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. of wall area when tested according to ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq.ft.

D. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
1. Wind Loads: Determine loads based on the following minimum design wind pressures:
a. Uniform pressure as indicated on Structural Drawings.
2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 of the span.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint

sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
a. Flashing and extruded trim.
b. Anchorage systems.

C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch- long Samples for each type of accessory.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:
1. Wall panels and attachments.
2. Stud framing.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
4. Penetrations of wall by pipes and utilities.

B. Qualification Data: For Installer, professional engineer and testing agency.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

D. Field quality-control reports.

E. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal wall panels to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

C. Source Limitations: Obtain each type of metal wall panel from single source from single manufacturer.

D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical wall panel, including window opening and corner, approximately one bay wide by one story high by full thickness, including insulation, supports, attachments, and accessories.
2. Conduct water spray test of mockup of metal wall panel assembly, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Preinstallation Conference: Conduct conference at Project site.
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal wall panel assembly during and after installation.
8. Review wall panel observation and repair procedures after metal wall panel installation.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for

drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.10 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication, and indicate measurements on Shop Drawings.

1.11 COORDINATION

A. Coordinate metal wall panel assemblies with air barrier and insulation work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.
2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M
1. Surface: Smooth, flat finish
2. Exposed Finish:
a. 2-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply

coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

B. Panel Sealants:
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.

2.2 MISCELLANEOUS METAL FRAMING ACCESSORIES

A. Sheet Metal, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Bearing Plates: Flat sheet steel no less than 6 inches square, 0.0598 inch (16 gage) nominal thickness.

C. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.3 MISCELLANEOUS MATERIALS

A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

2.4 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flat Panel with interlocking seam – Structural Panel, Hidden-Fastener Metal Wall Panels: Formed with flat surface and seam joint, seams at 8 inches o.c.
1. Basis-of-Design Product - Subject to compliance with requirements, provide:
a. ATAS International, Inc.; Opaline - OPF080
b. Or comparable product by one of the following:
1) Dimensional Metals, Inc.
2) PAC-CLAD, Petersen by Carlisle Corporation
1. Material: Metalic Coated Steel sheet, 24 gauge thick.
a. Exterior Finish: 2-coat fluoropolymer .
b. Color: As indicated in drawings, if not indicated, then as selected by Architect from manufacturer's full range including premium finish colors.
2. Panel Coverage: 8 inches.

3. Panel Height: 3/4 inch.

2.5 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
   1. Extrusion Closures: Provide manufacturer's extruded aluminum closures painted to match metal panels, including manuf. recommended receiver extrusions, angle trim and starter cleats:
      a. "Elite Base Trim" at bottom of metal panel to another wall construction;
      b. "Elite Head Trim" at bottom of metal panel to window system head condition;
      c. "Elite Jamb Cover" at vertical side of metal panel to a window system jamb;
         1) Similar at window sill conditions.
      d. "Elite Channel Cover" where vertical metal panel edge meets another wall construction;
      e. "Z Box": Provide finished metal panel and support trim at penetrations thru panel by light fixtures and electrical outlets.
   2. Vertical Seams between Metal Panels w/ horizontally running corrugation:
      a. Lap Seam: Provide lapped seams per manufacturer's details, typical unless noted otherwise.
      b. Reveal Extrusion: Where noted in drawings to receive trim between panels, provide:
         1) ATAS "Elite Transition Cover Extrusion w/ Reveal", incl. receiver extrusion and angle trim connection.
   3. Two Piece Extrusions: Provide where fastener access is limited.
   4. Corrugated Panel Edge Support:
      a. Provide concealed rigid metal support to ends of corrugated panels, per manuf. recommendations.
      b. Similar to ATAS "Support Z" product.
   5. Provide sealant as recommended by manufacturer.
   6. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
      a. ATAS "Support Z" product.

B. Ceiling Panel Accessories:
   1. Suspended Carrier System – Provide where system installed in ceiling/soffit configuration.
      a. Product: As recommended by manufacturer of formed metal panels.
      b. Refer to drawings for locations.

C. Vented Panels:
   1. Provide panels where system installed in ceiling / soffit configuration.
   2. Spacing frequency of vented panels to meet building code requirements and manufacture's recommendations.
      a. Spacing to meet Net Free Ventilating Area (NFVA) requirements.
      b. Layout to be coordinated with ceiling elements, including light fixtures.
      c. Layout to be approved by Architect.
   3. Color: To match adjacent solid panels.

D. Flashing and Trim: Formed from 0.040-inch minimum thickness aluminum sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

E. Bearing Plates: Formed from 16-gage minimum thickness, zinc-coated (galvanized) steel sheet minimum 6 inches square.

2.6 FABRICATION

A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

C. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.

D. Extrusions: Extrusions as supplied by Basis of Design manufacturer:
1. Basis of Design Product: Elite Series Trim, Atas International Inc.

E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.7 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
   1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
   3. Verify that vapor permeable air barrier has been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
   4. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to studs, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Commence metal wall panel installation and install minimum of 300 sq. ft. in presence of factory-authorized representative.
   2. Field cutting of metal wall panels by torch is not permitted.
   3. Rigidly fasten metal wall panels and allow for thermal expansion and contraction as required by the panel manufacturer. Pre-drill panels as required.
   4. Shim or otherwise plumb substrates receiving metal wall panels.
   5. Provide steel sheet bearing plates at attachment points to prevent metal panel from crushing insulation where not located at Z furring.
   6. Install screw fasteners.
   7. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.

8. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing and material compatibility.
9. Provide weatherproof seals for pipe and conduit penetrating exterior walls.
10. Elite Series trim and flashing components shall be installed in accordance with manufacturer's installation instructions to ensure proper weatherproofing. Additional sealants and closures may be required in accordance with manufacturer's installation details.
    a. Allow for drainage from behind metal wall panel installation at bottom closures.

B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.
1. Aluminum Wall Panels: Use stainless-steel fasteners or metallic coated fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
2. Concealed fasteners shall have a high performance coating
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.
4. Coat back side of aluminum wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.

C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than 6.24 lbf/sq. ft..

C. Water-Spray Test: After completing the installation of 75-foot- by-2-story minimum area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by Architect.

D. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.

E. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

F. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13

SECTION 07 42 13.23 – METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Factory-formed and field-assembled, concealed-fastener, butt, sealant-seamed metal-faced composite wall panels.

B. Related Sections include the following:
1. Division 01 Section “Submittal Procedures” for field sample panel special timing requirements applicable to the work of the Section.
2. Division 06 Section "Sheathing" for support framing and sheathing supporting metal wall panels.
3. Division 07 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.3 SYSTEM DESCRIPTION

A. Design Requirements:
1. Design system to accommodate movement of components without buckling, failure of joint seals, undue stress on fasteners, or other detrimental effects when subjected to temperature and humidity ranges reasonably anticipated.
2. Design system to accommodate tolerances of structure.

B. Performance Requirements:
1. Submit test data witnessed by an independent testing agency for the following requirements:
a. Structural tests for wind loads by "Chamber Method" in compliance with ASTM E72.
b. Standard test design loading: 20 psf (960 Pa) positive and negative wind load.
c. Design panel system to withstand code imposed design loads and a deflection limit of L/180 shall apply to positive load pressures only.
d. Design panel system to withstand code imposed design loads and a deflection limit of L/175 shall apply to positive load pressures only.
2. Air Infiltration: 0.06 cfm per square foot (32 lps per square meter) air leakage under a static pressure of 1.56 psf (7.65 kg per square meter) when tested in accordance with ASTM E283.
3. Water Penetration: No uncontrolled water penetration through the standard vertical panel and sealed joints at a static pressure of 6.24 psf (30.5 kg per square meter) when tested in accordance with ASTM E331.

1.4 DEFINITIONS

A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, sealants, and accessories necessary for a complete weathertight system.

1.5 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.

B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, integration with flashings specified elsewhere, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.

C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
1. Include similar Samples of trim and accessories involving color selection.
2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
a. Include four-way joint for composite panels.
2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
3. Accessories: 12-inch- long Samples for each type of accessory.
4. Exposed Sealants: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of metal wall panels adjacent to joint sealants.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

F. Maintenance Data: For metal wall panels to include in maintenance manuals.

G. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE

A. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal wall panels and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

B. Field Sample Panel: Product or products specified in this section are subject to special submittal procedures and incorporation in a coordinated field sample panel with other exterior materials as selected by the Architect. Provide size, length and/or configuration of sample products as indicated on plans based on preselected colors and materials as indicated on the finish legend. Field sample panel shall serve as the initial verification of exterior material selections and shall be reviewed and approved by Architect before products are ordered.

Sample panel components may be submitted in advance of other required submittals as specified in Division 01 Section “Submittal Procedures”.

1. Submit one full sized sample as indicated on plans for field sample panel.
2. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
3. Upon approval of field sample panel, submit verification samples in small sizes specified for recording field sample panel approvals.
4. Locate panels as indicated or, if not indicated, as directed by Architect.
5. Protect approved sample panels from the elements with weather-resistant membrane.
6. Maintain field sample panel during construction in an undisturbed condition as a standard for judging the completed Work.
7. Approval of sample panel is for color and sealant colors and other material and construction qualities specifically approved by Architect in writing.
8. Demolish and remove field sample panels when directed.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.

B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Store metal-faced composite wall panels vertically, covered with suitable weathertight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.

E. Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.

1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.9 WARRANTY

A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of

factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
   1. Basis-of-Design Products: The design for each composite panel specified is based on the product named. Provide specified product. Substitutions from the list of comparable manufacturers shall be subject to compliance with Division 01 requirements.

2.2 PANEL MATERIALS

A. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
   1. Surface: Smooth, flat finish.
   2. Exposed Finishes: Apply the following coating, as specified or indicated on Drawings.
      a. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
         1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
   3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Provide extrusions based on Basis of Design Manufacturer’s “One Piece Tight-Fit Moldings” for reveal design. One piece components include but are not limited to:
      a. Drip molding.
      b. H-Reveal molding.
      c. J moldings.
      d. Adjustable Outside corner.
   2. Trim Finish: Match panels.
   3. Provide extrusions for Routed & Return System.

C. Panel Sealants:
   1. Joint Sealant: ASTM C 920; elastomeric silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.

D. Foam Tape: Low density, closed cell polyvinyl chloride foam with adhesive backing on one side

and 7 mil clay coated paper on the other side.
1. Provide “V710” Gaska Tape, Inc.
2. Size: 3/16-inch thick by 2 inches wide.

2.3 MISCELLANEOUS MATERIALS

A. Furring: Cold Formed Metal Cladding attachment support system. Provide system at depth indicated to support metal panel.

B. Wall Strapping: Galvanized sheet steel complying with ASTM A 653 with G90 galvanized coating.
1. Thickness: 16 gage.
2. Width: 3 inches.

C. Fasteners: Self-tapping screws and clips designed to withstand design loads.
1. Fasteners for Wall Panels: Stainless steel self-drilling or self-tapping, phillips pan head wood screws.
2. Clips for Wall Panels: Stainless steel wire formed into a shape to allow capture by screw and for barbed point to engage edge of wall panel.

2.4 METAL COMPOSITE WALL PANELS

A. General: Provide factory-formed and -assembled metal-faced composite wall panels fabricated from two metal facings bonded, using no glues or adhesives, to corrugated extruded thermoplastic core; formed into profile for installation method indicated. Include attachment system components and accessories required for weathertight system.
1. Basis-of-Design Product:
   a. ATAS International, Inc. - SterraCore Metal Composite Material Panel System
   b. Or comparable product by Laminators Inc.

B. Aluminum-Faced Composite Wall Panels:
1. Formed with 0.0320-inch- thick, coil-coated aluminum sheet facings.
2. Core Thickness: 0.197 inch.
3. Panel Thickness: 6 mm
4. Exterior Finish: Fluoropolymer.
   a. Color: See Exterior Finish Legend on drawings.

C. System Perimeter Trim Components:
1. Formed from extruded aluminum w/ concealed fasteners.
2. Basis-of-Design Product:
   a. ATAS International, Inc. – SterraCore 1-Piece, Tight-Fit REVEAL H Extrusion
3. Trim Finish: Unless noted otherwise, match adjacent metal panel.

D. Screws and Clips: Stainless steel.

E. Panel Adhesive: Construction adhesive as recommended by panel manufacturer.

F. Flashing and Trim: Same material, finish, and color as facings of adjacent composite panels, unless otherwise indicated.

2.5 FIELD-INSTALLED THERMAL INSULATION

A. Refer to Section 07 21 00 "Thermal Insulation."

2.6 MISCELLANEOUS METAL FRAMING ACCESSORIES

A. Sheet Metal, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G60 hot-dip galvanized or coating with equivalent corrosion resistance unless otherwise indicated.

B. Flat Strapping: Flat sheet steel no less than 3 inches in width, 0.0598 inch (16 gage) nominal thickness.

C. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.7 ACCESSORIES

A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, clips, sealants, adhesives and similar items. Match material and finish of metal wall panels, unless otherwise indicated.

2.8 FABRICATION

A. General: Finish metal wall panels and accessories at the factory. Prepare panels in factory for field fabrication by cutting to size and back routing panels where panels are to be field formed into corners. Prepare by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.

B. Metal-Faced Composite Wall Panels: Factory form panels in a batch process by laminating each sheet using glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.
1. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
2. Dimensional Tolerances:
    a. Length: Plus 0.375 inch.
    b. Width: Plus 0.188 inch.
    c. Thickness: Plus or minus 0.008 inch.
    d. Panel Bow: 0.8 percent maximum of panel length or width.
    e. Squareness: 0.2 inch maximum.

2.9 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to

minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
   1. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
   2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

B. Coordinate with flashings and other sheet metal as specified in Division 07 Section "Sheet Metal Flashing and Trim."

C. Apply Z furring and or steel strapping vertically and horizontally over vapor permeable air and weather barrier and screw through weather barrier and sheathing to studs in accordance with manufacturer’s instructions. Attach with self tapping screws at 6 inches on center.

D. Apply J-molding or drip edge at bottom of panels or transitions in accordance with manufacturer’s instructions.

E. Apply foam tape and masking tape to metal strips in accordance with manufacturer’s instructions.

3.3 METAL WALL PANEL INSTALLATION, GENERAL

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Field cutting of metal wall panels by torch is not permitted.
   2. Shim or otherwise plumb substrates receiving metal wall panels.

B. Fasteners:
   1. Composite Wall Panels: Use stainless-steel fasteners.

C. Joint Sealers: Install sealants for weatherproof performance of metal wall panel assemblies. Provide types of sealants indicated utilizing products recommended by metal wall panel manufacturer.

1. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

3.4 METAL-FACED COMPOSITE WALL PANEL INSTALLATION

A. General: Install attachment system required to support wall panels and to provide a complete weathertight wall system, tight-fit reveal moldings, sealants and perimeter channels.
   1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
   2. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.

B. Tight-Fit Installation: Attach panel to walls with extrusions to receive panel edge. Comply with Basis of Design Manufacturer's "1-Piece Tight-Fit Molding Installation Manual", "Installing Over Gypsum with vapor permeable air barrier". Adhesively attach panels to Z furring and or metal strapping and secure with screws and extrusions.
   1. Set panels joints in moldings with sealants to create a watertight system. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants." Clean off excess sealants.
   2. Route back side of panels and fold panels at corners for a clean sharp line.

C. Trim: Install molding at perimeter of system and all intersections to permit tight-fit installation.

D. Rout & Return installations: Attach panels to wall with returned edge. Comply with basis of design manufacuture "Rout & Return" installation manual, fill joints with sealant.

3.5 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet, nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.

B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 43

SECTION 07 53 23 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered ethylene-propylene-diene-terpolymer (EPDM) roofing system.
2. Roof insulation.
3. Cover board.
4. Walkways.
5. Roof edge and coping accessories.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D1079 and glossary of NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness if insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation, thickness, and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane and fastening spacings and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with air barrier.

C. Samples for Verification: For the following products:

1. Roof membrane and flashings of color required.
2. Walkway pads or rolls, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

a. Submit evidence of complying with performance requirements.

2. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For components of roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES.

1. Field Test Reports:
2. Concrete internal relative humidity test reports.
3. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

E. Field quality-control reports.

F. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.

B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

C. Source Limitations: Obtain components including roof insulation, adhesives and fasteners, self adhering flashing, roof edge treatment, coping, termination bars, pourable sealer and any related products edge to edge for membrane roofing system from same manufacturer as membrane roofing manufacturer.

D. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner’s insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer’s representative, deck

Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system "Edge to Edge".

2. Warranty Period: 20 years from Date of Substantial Completion.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, roof pavers, and walkway products, for the following period.

1. Warranty Period: Two (2) years from date of Substantial Completion.

C. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
   a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
   b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
   c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation, and fasteners for roof insulation, and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D3746, ASTM D4272, or the Resistance to Foot Traffic Test in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist wind uplift pressures as indicated on the drawings when tested according to FM Approvals 4474, UL 580, or UL 1897.

D. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 ETHYLENE-PROPYLENE-DIENE-TERPOLYMER (EPDM) ROOFING

A. EPDM Sheet: ASTM D4637/D4637M, Type I, nonreinforced, EPDM sheet.

1. Basis of Design: Basis-of-Design Product: Subject to compliance with requirements, provide Versico Versigard Non-Reinforced EPDM roofing or comparable product by one of the following:

   a. Elevate Roofing (formerly Firestone)
   b. Johns Manville.
   c. Carlisle Syntec.

2. Thickness: 60 mils, nominal.
3. Exposed Face Color: Black.
4. Source Limitations: Obtain components for roofing system from manufacturers approved by roof membrane manufacturer.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: 60-mil-thick EPDM, partially cured or cured, according to application.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Roof Vents: As recommended by roof membrane manufacturer.

1. Size: Not less than 4-inch diameter.

E. Bonding Adhesive: Manufacturer's standard.

F. Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 6-inch-wide minimum, butyl splice tape with release film.

G. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

I. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

J. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

K. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to roofing system manufacturer.

L. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by EPDM membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Basis of Design: Basis-of-Design Product: Subject to compliance with requirements, provide Versico Versicore MP-H Polyiso or comparable product approved by roof manufacturer to meet warranty and compliance requirements:
   a. Carlisle SynTec Incorporated.
   b. Elevate Building Products
   c. Johns Manville; a Berkshire Hathaway company.

2. Compressive Strength: 20 psi.
3. Size: 48 by 96 inches.

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/2 inch.
3. Slope: ¼"

   a. Roof Field: 1/4 inch per foot unless otherwise indicated on Drawings.
   b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

D. Total System Thickness: As indicated on Drawings but not less than required to achieve R-30.

E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Provide one of the following:
   a. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
   b. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

D. Cover Board: ASTM C1177/C1177M, glass-mat, water-resistant gypsum substrate, or ASTM C1278/C1278M, fiber-reinforced gypsum board.

1. Available Manufacturers: Subject to compliance with requirements, provide or comparable product by one of the following:

   a. Georgia Pacific LLC.
   b. USG Corporation.
   c. National Gypsum Corporation.

2. Thickness: ½" unless noted otherwise on the drawings.
3. Surface Finish: Factory primed.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Size: Approximately 30 by 30 inches.
2. Type: Self-adhered to membrane with primer and pre-applied tape.
3. Color: Contrasting with roof membrane.

2.8 MANUFACTURED COPING

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
1. Basis-of-Design Product: Subject to compliance with requirements, provide "VersiTrim One Coping"; Versico or comparable product by one of the following:
   a. Metal-Era, Inc.
2. Coping-Cap Material: Formed aluminum, 0.050 inch (1.02 mm) thick.
   a. Finish: Two-coat fluoropolymer.
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
5. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches (300 mm) wide, with integral cleats.
6. Finish Color: Custom as selected by Architect.

2.9 ROOF-EDGE FLASHINGS

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous 20ga Galvanized steel anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
1. Basis-of-Design Product: Subject to compliance with requirements, provide "VersiTrim One Edge", Fascia System; Versico or comparable product by one of the following:

a. Metal-Era, Inc.
2. Fascia Cover: Fabricated from the following exposed metal:
a. Formed Aluminum: 0.040 inch (1.02 mm) thick.
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
5. Finish Color: As selected by architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

1. Submit test result within 24 hours of performing tests.

a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

3.4 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with end joints staggered not less than 12 inches in adjacent rows.

    a. Locate end joints over crests of decking where shown on the drawings.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.

        1) Trim insulation so that water flow is unrestricted.

    e. Fill gaps exceeding 1/4 inch with insulation.
    f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
    g. Loosely lay base layer of insulation units over substrate.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches from previous layer of insulation.

    a. Install with long joints continuous and with end joints staggered not less than 12 inches in adjacent rows.
    b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
    c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
    d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches.
    e. Trim insulation so that water flow is unrestricted.
    f. Fill gaps exceeding 1/4 inch with insulation.
    g. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

3. Mechanically fasten insulation: Install insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
    a. Fasten first layer of insulation according to requirements in FM Approvals' for specified Windstorm Resistance Classification
    b. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof

3.5 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

    a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:

    a. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF ADHERED ROOFING

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll membrane roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeters.

G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

H. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement.

1. Firmly roll side and end laps of overlapping roof membrane to ensure a watertight seam installation.
2. Apply lap sealant and seal exposed edges of roofing terminations.
3. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.

I. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

J. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 INSTALLATION OF WALKWAYS

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

1. Install flexible walkways at the following locations:

    a. Perimeter of each rooftop unit.
    b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
    c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
    d. Top and bottom of each roof access ladder.
    e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
    f. Locations indicated on Drawings.
    g. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings to meet performance requirements.
1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at 30-inch centers.

3.10 ROOF-EDGE FLASHING INSTALLATION

A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.11 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.12 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 53 23

SECTION 075419 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered polyvinyl chloride (PVC) roofing system.
2. Accessory roofing materials.
3. Roof insulation.
4. Insulation accessories and cover board.
5. Walkways.
6. Roof edge and coping accessories.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation.
2. Base flashings and membrane terminations.
3. Flashing details at penetrations.
4. Tapered insulation thickness and slopes.
5. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
6. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
7. Tie-in with air barrier.

C. Samples: For the following products:

1. Roof membrane and flashing, of color required.
2. Walkway pads or rolls, of color required.
3. Roof edge metal color samples.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturer Certificates:

1. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

B. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.

C. Research reports.

D. Field Test Reports:

1. Concrete internal relative humidity test reports.
2. Fastener-pullout test results and manufacturer's revised requirements for fastener patterns.

E. Field quality-control reports.

F. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.7 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturers: A qualified manufacturer that is UL listed for roofing system identical to that used for this Project.
2. Installers: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
1. Special warranty includes roof membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, and other components of roofing system “Edge to Edge”.

2. Warranty Period: 20 years from date of Substantial Completion.

B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components including roof insulation, and fasteners for roof insulation, and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roof membrane to withstand 2000 hours of exposure when tested according to ASTM G152, ASTM G154, or ASTM G155.

B. Impact Resistance: Roof membrane to resist impact damage when tested according to ASTM D3746, ASTM D4272/D4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

C. Material Compatibility: Roofing materials to be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

D. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

E. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

F. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 POLYVINYL CHLORIDE (PVC) ROOFING

A. PVC Sheet Type III: ASTM D4434/D4434M, fabric reinforced.

   1. Basis of Design: Basis-of-Design Product: Subject to compliance with requirements, provide Duro Last Roofing System, Duro-Tuff Adhered PVC roofing or comparable product meeting same requirements and appearance/ color.
   2. Thickness: 50 mils (1.27 mm).
   3. Exposed Face Color: Bright Red.

2.4 ACCESSORY ROOFING MATERIALS

A. General: Accessory materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.

1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Bonding Adhesive: Manufacturer's standard.

E. Metal Termination Bars: Manufacturer's standard, predrilled stainless steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.

1. Product: As Approved by roofing manufacturer.
2. Size: 48 by 96 inches (1219 by 2438 mm).
3. Compressive Strength: 20 psi

B. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation.
2. Minimum Thickness: 1/4 inch (6.35 mm).
3. Slope:

a. Roof Field: 1/4 inch per foot (1:48) unless otherwise indicated on Drawings.
b. Saddles and Crickets: 1/2 inch per foot (1:24) unless otherwise indicated on Drawings.

2.6 INSULATION ACCESSORIES AND COVER BOARD

A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover board to substrate, and acceptable to roofing system manufacturer.

B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
   1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
   2. Full-spread, spray-applied, low-rise, two-component urethane adhesive.

C. Glass-Mat Gypsum Cover Board: ASTM C1177/C1177M, water-resistant gypsum board.

   1. Product: As approved by roofing manufacturer.
   2. Thickness: 1/2 inch (13 mm).
   3. Surface Finish: Factory primed.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.

   1. Size: Approximately 36 by 60 inches (914 by 1524 mm).
   2. Color: Contrasting with roof membrane.

2.8 MANUFACTURED COPING

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide “Snap Coping”; Duro Last or comparable product by one of the following:
      a. Metal-Era, Inc.
   2. Coping-Cap Material: Formed aluminum, 0.040 inch (1.02 mm) thick.
      a. Finish: Two-coat fluoropolymer.
   3. Corners: Factory mitered and mechanically clinched and sealed watertight.
   4. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
   5. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches (300 mm) wide, with integral cleats.
   6. Finish Color: Custom as selected by Architect.

2.9 ROOF-EDGE FLASHINGS

A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous 20ga Galvanized steel anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide “T-Edge”, Fascia System; Duro Last or comparable product by one of the following:
      a. Metal-Era, Inc.
   2. Fascia Cover: Fabricated from the following exposed metal:
      a. Formed Aluminum: 0.040 inch (1.02 mm) thick.
   3. Corners: Factory mitered and mechanically clinched and sealed watertight.
   4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.
   5. Finish Color: As selected by architect.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

3.2 PREPARATION

A. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

1. Submit test result within 24 hours of performing tests.

a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

A. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

B. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 072726 "Fluid-Applied Membrane Air Barriers."

3.4 INSTALLATION OF INSULATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Installation Over Metal Decking:

1. Install base layer of insulation with joints staggered not less than 24 inches (610 mm) in adjacent rows.

a. Locate end joints over crests of decking.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (610 mm).

1) Trim insulation so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch (6 mm) with insulation.

f. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
g. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to metal decks.
1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches (305 mm) from previous layer of insulation.
a. Install with long joints continuous and with end joints staggered not less than 12 inches (305 mm) in adjacent rows.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (610 mm).
e. Trim insulation so that water flow is unrestricted.
f. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
g. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

D. Installation Over Wood Decking:

1. Mechanically fasten slip sheet to roof deck using mechanical fasteners specifically designed and sized for fastening slip sheet to wood decks.
a. Fasten slip sheet to resist specified uplift pressure at corners, perimeter, and field of roof.

2. Install base layer of insulation with end joints staggered not less than 12 inches (305 mm) in adjacent rows.
a. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
b. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
c. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (610 mm).

1) Trim insulation so that water flow is unrestricted.

d. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
e. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
f. Mechanically attach base layer of insulation using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to wood decks.
1) Fasten insulation to resist specified uplift pressure at corners, perimeter, and field of roof.

3. Install upper layers of insulation and tapered insulation with joints of each layer offset not less than 12 inches (305 mm) from previous layer of insulation.

a. Install with long joints continuous and with end joints staggered not less than 12 inches (305 mm) in adjacent rows.
b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
c. Make joints between adjacent insulation boards not more than 1/4 inch (6 mm) in width.
d. At internal roof drains, slope insulation to create a square drain sump with each side equal to the diameter of the drain bowl plus 24 inches (610 mm).

    1) Trim insulation so that water flow is unrestricted.

e. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
f. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.

3.5 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to slope of drain sump.

    a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to substrate using adhesive according to FM Global Property Loss Prevention Data Sheet 1-29, as follows:
    a. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

3.6 INSTALLATION OF ADHERED ROOF MEMBRANE

A. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow to relax before installing.

C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.

F. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

G. Apply roof membrane with side laps shingled with slope of roof deck where possible.

H. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

I. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 INSTALLATION OF BASE FLASHING

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 INSTALLATION OF WALKWAYS

A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.

1. Install flexible walkways at the following locations:

a. Perimeter of each rooftop unit.
b. Between each rooftop unit location, creating a continuous path connecting rooftop unit locations.
c. Between each roof hatch and each rooftop unit location or path connecting rooftop unit locations.
d. Top and bottom of each roof access ladder.
e. Between each roof access ladder and each rooftop unit location or path connecting rooftop unit locations.
f. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch (76-mm) clearance between adjoining pads.
3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion, in presence of Architect, and to prepare inspection report.

B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

3.10 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 075419

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed wall sheet metal fabrications.
3. Date Stone box liner.

B. Related Sections
1. Division 01 Section “Submittals” for field sample panel special timing requirements applicable to the work of the section.
2. Division 06 Section “Rough Carpentry” for wood nailers, curbs and blocking.
3. Division 07 Section "EPMD Roofing” for installing sheet metal flashing and trim integral with membrane roofing and manufactured coping and fascias.
4. Division 07 Section “Composite Material Wall Panels” for installing sheet metal flashing and trim as required for transitions between materials and flashing.
5. Division 08 Section “Aluminum Framed Entrances and Storefront” and “Glazing Aluminum Curtain Walls” for flashing and closures related to that system.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of roof-penetration flashing.

8. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
9. Include details of special conditions.
10. Include details of connections to adjoining work.

C. Samples for Initial Selection: For each type of sheet metal flashing, trim and accessory indicated with factory applied color finishes involving selection.

D. Sample for Verification: For each type of exposed finish required, prepared on samples of size indicated below:
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

C. Mockups: Product or products specified in this section are subject to incorporation into Mockup. Before construction of exterior envelope, build mockups to verify selections made under sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Build mockups of typical exterior wall components as shown on Drawings.
3. Demonstrate cleaning and protecting of components.
4. Provide water spray test.
5. Obtain Architect's approval of mockups before casting cast stone or building exterior wall components that involve water management.

6. Clean one-half of exposed faces of masonry portions of mockups with masonry cleaner as indicated.
7. Protect accepted mockups from the elements with weather-resistant membrane.
8. Approval of mockups is for Colors, joints and terminations, quality of workmanship; and aesthetic qualities of workmanship of all elements.
    a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
9. Demolish and remove Mockup when directed by Architect.

1.6 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, are to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim are not to rattle, leak, or loosen, and are to remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
   1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

   2. Exposed Coil-Coated Finish:

      a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
         1) Color and Gloss: As indicated on finish legend, if not indicated then as selected by Architect from full range of various finish manufacturers' preformulated colors.
         2) Concealed Finish: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

C. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.
   1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).

D. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
   1. Application: Date stone box liner and transition flashing at coping and cast stone.
   2. Products: Subject to compliance with requirements, provide the following:
      a. Revere Copper Products, Inc.; FreedomGray.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet Underlayment: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer in accordance with underlayment manufacturer's written instructions.
   1. Products: Subject to compliance with requirements, provide the following provide one of the following:
      a. Carlisle Coatings & Waterproofing; CCW WIP 300HT.
      b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
      c. Henry Company; Blueskin PE200 HT.
      d. Metal-Fab Manufacturing, LLC; MetShield.
      e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
   2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C) or lower.

B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

A. Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

    a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
    c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
3. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
4. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

C. Solder:

1. For Zinc-Tin Alloy-Coated Copper: ASTM B32, 100 percent tin.
2. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Bituminous Coating: Cold-applied asphalt emulsion in accordance with ASTM D1187/D1187M.

H. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Material: Aluminum, 0.024 inch (0.61 mm) thick.
2. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
    a. Location: Framed walls
3. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
4. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
5. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
6. Accessories:

    a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.
    1. Stainless Steel: 0.016 inch thick.
        a. Products: Subject to compliance with requirements, provide one of the following:
            1) Cheney Flashing Company; Cheney Flashing (Sawtooth).
            2) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
            3) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.

B. Through Wall Reglets and Counterflashing: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet. Custom form counter flashings where indicated.
    1. Basis of Design Product: Cheney Flashing Company, Model TW-2S “Sawtooth Thru Wall Flashing w/ RL Quick Lock Reciever” or equal products by one of the following:
        a. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
        b. Keystone Flashing Company, Inc
    2. Through Wall Reglet Material: Stainless steel, 0.019 inch thick.
    3. Counterflashing Material: Aluminum, 0.040 inch think
    4. Through Wall Type: Two part assembly of stainless steel for full embedment in masonry and with interior leg of sufficient length to penetrate interior wythe.
    5. Accessories:
        a. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
    6. Finish: Mill.

2.6 FABRICATION, GENERAL

A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.

1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances:

1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Seams:

1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

G. Date Stone Box Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seames, form seams, and solder.

2.7 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.
      a. Location Where in contact with other aluminum components.
   2. Stainless Steel: 0.0156 inch (0.396 mm) thick.
      a. Location: Typical

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Date Stone Box: Fabricate from the following materials:
   1. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering, High-Temperature Sheet Underlayment:

   1. Install self-adhering, high-temperature sheet underlayment; wrinkle free.
   2. Prime substrate if recommended by underlayment manufacturer.
   3. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures.
   4. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses.
   5. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller.
   6. Roll laps and edges with roller.
   7. Cover underlayment within 14 days.

B. Install slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

   1. Install in shingle fashion to shed water.
   2. Lapp joints not less than 4 inches (100 mm).

3.2 INSTALLATION, GENERAL

A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.

   1. Install fasteners**, solder**, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
   2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
   3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.

4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
5. Space individual cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
6. Install sealant tape where indicated.
7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
8. Do not field cut sheet metal flashing and trim by torch.
9. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or SMACNA.

1. Coat concealed side of uncoated-aluminum and stainless steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.

1. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
3. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated.
   a. Form joints to completely conceal sealant.
   b. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way.
   c. Adjust setting proportionately for installation at higher ambient temperatures.

      1) Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.

1. Pretin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pretinning where pretinned surface would show in completed Work.

2. Do not solder aluminum sheet.
3. Do not pretin zinc-tin alloy-coated copper.
4. Do not use torches for soldering.
5. Heat surfaces to receive solder, and flow solder into joint.

    a. Fill joint completely.
    b. Completely remove flux and spatter from exposed surfaces.

6. Stainless Steel Soldering:

    a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
    b. Promptly remove acid-flux residue from metal after tinning and soldering.
    c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

H. Rivets: Rivet joints in uncoated aluminum and zinc where necessary for strength.

3.3 INSTALLATION OF ROOF FLASHINGS

A. Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard.

1. Provide concealed fasteners where possible, and set units true to line, levels, and slopes.
2. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless steel draw band and tighten.

C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing.

1. Insert counterflashing in reglets or receivers and fit tightly to base flashing.
2. Extend counterflashing 4 inches (100 mm) over base flashing.
3. Lap counterflashing joints minimum of 4 inches (100 mm).

D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.4 INSTALLATION OF WALL FLASHINGS

A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

C. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section “Unit Masonry”.

3.5 REGLETS AND COUNTERFLASHING INSTALLATION

A. Embedded Reglets: See Division 04 Section "Unit Masonry" for installation of reglets.

B. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Fit counterflashings tightly to base flashings.

3.6 INSTALLATION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.7 CLEANING

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

3.8 PROTECTION

A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Roof-edge drainage systems.
2. Downspout Boots.

B. Preinstallation Conference: Conduct conference at Project site.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.

C. Samples: For each type of roof specialty and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. FM Approvals' Listing: Manufacture and install roof-edge specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with FM Approvals' markings.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 ROOF-EDGE DRAINAGE SYSTEMS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Architectural Products Company.
2. Castle Metal Products.
3. Metal-Era, Inc.
4. Perimeter Systems; A division of Sothern Aluminum Finishing Company.

B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 m), with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch (25 mm) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
1. Aluminum Sheet: 0.032 inch (0.81 mm) thick.
2. Gutter Profile: Style A, box gutter according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and mechanically clinched and sealed watertight.
4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.
5. Gutter Accessories: Wire ball downspout strainer.

C. Downspouts: Plain rectangular complete with machine-crimped elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Formed Aluminum: 0.032 inch (0.81 mm) thick.

D. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Architect from manufacturer's full range.

2.3 DOWNSPOUT BOOT

A. Manufacturer: Downspout Boots.com, a division of J.R. Hoe.
   1. Product: Basis-of-Design, Model No. Offset Downspout Boot
   2. Options:
      a. Height: 72 inch.
      b. Size: sized to accommodate 4 inch by 5 inch downspout
      c. 2” Cleanout Access
      d. Galvanized
   3. Finish: Powder coating finish

2.4 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation.

B. Aluminum Sheet: ASTM B209 (ASTM B209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

2.5 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F (116 deg C).
   2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F (29 deg C).

B. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum.

2.6 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

   1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
   2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
   3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.

B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane or silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.

2.7 FINISHES

A. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat.

PART 3 - EXECUTION

3.1 INSTALLATION OF UNDERLAYMENT

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
1. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

3.2 INSTALLATION, GENERAL

A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm)> of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

3.3 INSTALLATION OF ROOF-EDGE DRAINAGE SYSTEMS

A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.
1. Connect downspouts to underground drainage system indicated.

3.4 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 077100

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Roof hatches.

1.2 SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: For roof accessories.

C. Samples: For each exposed product and for each color and texture specified.

D. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items.

E. Operation and maintenance data.

F. Warranty: Sample of special warranty.

1.3 WARRANTY

A. Base flashing integrity of roof hatch shall be included in Edge to Edge warranty for roofing system.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
1. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.

B. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.

2.2 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

C. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.

D. Sealants: As recommended by roof accessory manufacturer for installation indicated.

2.3 ROOF HATCH

A. Roof Hatches: Metal roof-hatch units with lids and insulated single-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, and integrally formed deck-mounting flange at perimeter bottom.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Surespan Model SRHTB-FR or comparable product meeting requirements.

B. Type and Size: Single-leaf lid, 30 by 48 inches.

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Aluminum sheet, 0.090 inch thick.
   1. Finish: Clear anodic.

E. Construction:
   1. Insulation: Cellulosic-fiber board.
   2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of galvanized sheet steel.
   3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
   4. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
   5. Fabricate curbs to minimum height of 12 inches unless otherwise indicated.
   6. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is constant. Equip hatch with water diverter or cricket on side that obstructs water flow.
   7. Fire Rating: Provide unit providing 60 minute rating and complying with EN 1634-4 and UL-EU and EN certified.

F. Hardware: Galvanized-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
   1. Provide two-point latch on lids larger than 84 inches.

G. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder. Post locks in place on full extension; release mechanism returns post to closed position.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.
   1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
   2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
   3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
   4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.

C. Seal joints with sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Division 09 painting Sections.

C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls. See code plan for locations of new and existing rated wall locations.
2. Penetrations in horizontal assemblies.
3. Penetrations in smoke barriers. Treat all new or existing full height walls (floor slab to roof deck) as smoke partition.

B. Related Sections include the following:
1. Division 07 Section “Joint Firestopping”
2. Division 22 and 23 Sections specifying duct and piping penetrations.
3. Division 26, 27, and 28 Sections specifying cable and conduit penetrations.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product data.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

A. Listed system designs.

B. Qualification Data: For installer.

C. Product Certificates: For through-penetration firestop system products, signed by product manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. A. Products: Subject to compliance with requirements, provide one of the through-penetration firestop systems indicated for each application that are produced by one of the following manufacturers:
1. Hilti, Inc
2. Johns Manville
3. 3M; Fire Protection Products Division
4. Tremco; Sealant/Weatherproofing Division.
5. USG Corporation.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with listed system designs published by a qualified testing agency.

1) UL in its online directory "Product iQ."
2) Intertek Group in its "Directory of Building Products."
3) FM Approvals in its "Approval Guide."

2.3 PENETRATION FIRESTOPPING SYSTEMS

A. Description: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems are to be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: Not less than the fire-resistance rating of the wall penetrated.
2. Membrane Penetrations: Install recessed fixtures such that the required fire resistance will not be reduced.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of the floor penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of the floor. The following floor penetrations do not require a T-rating:

a. Those within the cavity of a wall.
b. Floor, tub, or shower drains within a concealed space.
c. 4-inch or smaller metal conduit penetrating directly into metal-enclosed electrical switchgear.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF PENETRATION FIRESTOPPING SYSTEMS

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

D. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 07 84 13

SECTION 07 84 43 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.
3. Joints in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly developed in accordance with current International Firestop Council (IFC) guidelines.

1.4 INFORMATIONAL SUBMITTALS

A. Listed System Designs: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:

    a. Joint firestop systems installed with products bearing the classification marking of a qualified product certification agency in accordance with Listed System Designs published by a qualified testing agency.

        1) UL in its online directory "Product iQ."
        2) Intertek Group in its "Directory of Building Products."

2.2 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide joint firestopping by one of the following:
1. Hilti, Inc.
2. Nelson Firestop Products.
3. 3M; Fire Protection Products Division
4. USG Corporation
5. Tremco; Sealant/ Weatherproofing Division

2.3 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems must accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture.
2. Provide firestop products that do not contain ethylene glycol.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.

C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.

D. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
   1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

2.4 ACCESSORIES

A. Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

B. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

   1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

D. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:

   1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
   2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
   3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Wall Identification: Permanently label walls containing firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.

   1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 ft. from end of wall and at intervals not exceeding 30 ft..

B. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.

B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.

C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

END OF SECTION 07 84 43

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
   1. New and newly created exterior joints in the following vertical surfaces and horizontal nontraffic surfaces:
      a. Control and expansion joints in unit masonry and natural stone.
      b. Joints in metal trim.
      c. Joints between different materials listed above.
      d. Perimeter joints between materials listed above and frames of doors, translucent panels and windows.
      e. Other joints as indicated.
   2. New and newly created interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings where indicated.
      c. Vertical joints on exposed surfaces of interior unit masonry walls.
      d. Perimeter joints between interior wall surfaces and frames of interior doors windows and ceilings.
      e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      f. Joints between different materials listed above
      g. Other joints as indicated.
   3. New and newly created interior joints in the following horizontal traffic surfaces:
      a. Isolation joints in cast-in-place concrete slabs.
      b. Other joints as indicated.

B. Related Sections include the following:
   1. Division 07 Section "EPDM Roofing" and “Standing Seam Metal Roofing” for sealing joints in these constructions.
   2. Division 08 Section "Glazing" for glazing sealants.
   3. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 PERFORMANCE REQUIREMENTS

A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

D. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.

E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.

F. Qualification Data: For Installer and testing agency.

G. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.

H. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

I. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used.
1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

J. Field Test Report Log: For each elastomeric sealant application.

K. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.

L. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period preceding the commencement of the Work.
1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:
1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: 5 years from date of Substantial Completion.

C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
2. Disintegration of joint substrates from natural causes exceeding design specifications.

3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: Match Architect's samples for polyurethane sealants. For all other types of sealants, colors shall be as selected by Architect from manufacturer's full range.

2.3 ELASTOMERIC JOINT SEALANTS

A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

B. Suitability for Contact with Food: Where elastomeric sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

C. Single-Component Neutral- Silicone Sealant ES-1:
1. Available Products:
   a. Dow Corning Corporation; 791.
   b. GE Silicones; SilPruf NB SCS9000.
   c. Pecora Corporation; 895.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
   a. Use O Joint Substrates: Aluminum coated with a high-performance coating, concrete block.
6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.

D. Single-Component Mildew-Resistant Acid-Curing Silicone Sealant ES-2:
1. Available Products:
   a. Dow Corning Corporation; 786 Mildew Resistant.
   b. GE Silicones; Sanitary SCS1700.
   c. Tremco; Tremsil 200 Sanitary, White.
2. Type and Grade: S (single component) and NS (nonsag).
3. Class: 25.
4. Use Related to Exposure: NT (nontraffic).

5. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
    a. Use O Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, ceramic tile and concrete masonry.

E. Multicomponent Nonsag Urethane Sealant ES-3:
1. Available Products:
    a. Pecora Corporation; Dynatrol II.
    b. Tremco; Dymeric 240.
2. Type and Grade: M (multicomponent) and NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (nontraffic).
5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
    a. Use O Joint Substrates: Color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, brick, ceramic tile and porcelain, wood and concrete masonry.
6. Provide color packs to custom color match sealant color to Architect's sample.

F. Single Component Pourable Urethane Sealant ES-4:
1. Available Products:
    a. Bostik Findley; Chem-Calk 950.
    b. Pecora Corporation; Urexpan NR-201.
    c. Polymeric Systems Inc.; Flexiprene 952.
    d. Sika Corporation; Sikaflex - 1CSL.
    e. Tremco; Vulkem 45.
2. Type and Grade: S (single component) and P (pourable).
3. Class: 25.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
    a. Use O Joint Substrates: Concrete and concrete masonry.

2.4 LATEX JOINT SEALANTS

A. Latex Sealant LS-1: Comply with ASTM C 834, Type P, Grade NF.

B. Available Products:
1. Bostik Findley; Chem-Calk 600.
2. Pecora Corporation; AC-20+.
3. Schnee-Morehead, Inc.; SM 8200.
4. Sonneborn, Division of ChemRex Inc.; Sonolac.
5. Tremco; Tremflex 834.

2.5 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
      a. Concrete.
      b. Masonry.
      c. Unglazed surfaces of ceramic tile.
      d. Concrete Masonry.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
      a. Metal.
      b. Glass.
      c. Porcelain enamel.

d. Glazed surfaces of ceramic tile.
e. Glazed surfaces of toilet and lavatory fixtures.

B. Joint Priming: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Acoustical Sealant Application Standard: Comply with recommendations in ASTM C 919 for use of joint sealants in acoustical applications as applicable to materials, applications, and conditions indicated.

D. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

E. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

F. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

G. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
4. Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.

5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193.
   a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application JS-1: Exterior vertical control and expansion joints in unit masonry and cast stone.
   1. Joint Sealant: Single-component nonsag urethane sealant ES-3.
   2. Joint-Sealant Color: Match mortar color.

B. Joint-Sealant Application JS-2: Exterior joints metal fascia, flashing and trim.
   1. Joint Sealant: Single-component neutral-curing silicone sealant ES-1.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

C. Joint-Sealant Application JS-3: Exterior perimeter joints between masonry (including cast stone) and frames of doors, windows and louvers.
   1. Joint Sealant: Multicomponent nonsag urethane sealant ES-3.
   2. Joint-Sealant Color Match Architect's Sample.

D. Joint-Sealant Application JS-4: Vertical control and expansion joints on exposed interior surfaces of exterior walls.
   1. Joint Sealant: Multicomponent nonsag urethane sealant ES-3.
   2. Joint-Sealant Color: Match Architect's Sample.

E. Joint-Sealant Application JS-5: Interior perimeter joints of exterior openings.
   1. Joint Sealant: Latex sealant.
   2. Joint-Sealant Color: Match Architect's Sample.

F. Joint-Sealant Application JS-6: Interior joints between plumbing fixtures and adjoining walls, floors, and counters.
   1. Joint Sealant: Single-component mildew-resistant acid-curing silicone sealant ES-2.
   2. Joint-Sealant Color: White.

G. Joint-Sealant Application JS-7: Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
   1. Joint Sealant: Latex sealant.
   2. Joint-Sealant Color: Match Architect's Sample.

H. Joint-Sealant Application JS-8: Perimeter joints between interior wall surfaces and frames of interior doors, and perimeter of ceiling systems intersection with wall.
   1. Joint Sealant: Latex sealant.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

I. Joint-Sealant Application JS-9: Interior control, expansion, and isolation joints in horizontal traffic surfaces of concrete flooring.
   1. Joint Sealant: Single component, pourable urethane sealant ES-4.
   2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

B. Related Requirements:
1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Door Hardware" for door hardware for hollow-metal doors.
3. Division 09 Sections "Painting" for field painting hollow metal doors and frames.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.3 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 ACTION SUBMITTALS

Product Data: For each type of product. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

A. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.

6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

B. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

A. Product

1.6 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

B. Provide Manufacturer / Installer Warranty

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies is to meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10C.
1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

E. Egress Door Inspector Qualifications: Inspector for field quality control inspections of egress door assemblies is to meet the qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking.
1. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

D. During delivery, storage and handling protect frames from damage.
1. Do not store in a manner that traps excess humidity.

1.9 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings, and where patching verify existing frame size, profile and thickness by field measurements before fabrication.

1.10 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver items to project site in time for installation.

1.11 GAGE STANDARDS

A. Gages specified are based on U.S. Standard Gauge for hot rolled and cold rolled steel sheets.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with performance requirements, provide products of one of the listed manufacturers.

2.2 DOORS AND FRAMES

A. Manufacturer:
1. Acme & Dorf Door Corp.
2. Amweld Building Products, LLC.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.

5. Fleming Door Products Ltd.; an Assa Abloy Group company.
6. Mesker Door Inc.
7. Pioneer Industries, Inc.
8. Security Metal Products Corp.
9. Steelcraft; an Ingersoll-Rand company.

2.3 PERFORMANCE REQUIREMENTS

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
   1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C1363 or ASTM E1423.

2.4 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

   1. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches.
      c. Face: Uncoated steel sheet, minimum thickness of 0.053 inch.
      d. Edge Construction: Model 2, Seamless.
      e. Edge Bevel: Provide manufacturer's standard beveled.
      f. Core: Polystyrene
      g. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.

   2. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
      b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
      c. Construction: Full profile welded.
         1) Face welded frames allowed where existing construction prohibits installation of full profile welded.

   3. Exposed Finish: Prime

2.5 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Maximum-Duty Doors and Frames: ANSI/SDI A250.8, Level 4; ANSI/SDI A250.4, Level A.

1. Doors:
   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches.
   c. Face: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum A60 coating.
   d. Edge Construction: Model 2, Seamless.
   e. Edge Bevel: Provide manufacturer's standard beveled.
   f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
   g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
   h. Core: Polyurethane
   i. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated doors.

2. Frames:
   a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch, with minimum A60 coating.
   b. Construction: Full profile welded, thermally broken (exterior conditions).
      1) Face welded frames allowed where existing construction prohibits installation of full profile welded.

3. Exposed Finish: Factory.

2.6 BORROWED LITES

A. Fabricate of steel sheet, thickness to match adjacent door frame thickness.

B. Construction: (Match adjacent door frame construction)

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.7 HOLLOW-METAL PANELS

A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies, where noted in drawings.

2.8 FRAME ANCHORS

A. Jamb Anchors:
   1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
c. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
d. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
1. Formed from same material as frames, not less than 0.042 inch thick, and as follows:
2. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
3. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.9 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

H. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.10 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
   1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding, or by rigid mechanical anchors.
   2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
      a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
      b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
   2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted hairline joints.
   1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
   3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
   4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
   5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.11 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
   1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

B. Factory Finish: Clean, pretreat, and apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, complying with ANSI/SDI A250.3.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the following prior to installation:
   1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   2. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
   3. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
   4. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 FRAME PATCHING AND MODIFICATION

A. Patching General: Where frames are indicated to be patched, cut frame at least 12 inches above existing bottom of frame. Carefully loosen the frame from the existing masonry without damaging the existing masonry. Comply with the straightness and tolerances for new frames.
   1. Field splice at locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Treat back of patching element with bituminous coating, fill with grout before setting. Use surface anchors recessed and filled with autobody filler and sanded smooth. Prime paint.

B. Modification General: Where horizontal mullions are to be relocated, remove existing glass and stops. Dispose of glass. Remove horizontal element by cutting and grinding to minimize damage to mullion being removed or to frame. Contractor’s option to provide new frame element to match or to salvage and reuse existing frame. Weld mullion into new location true to level. Weld continuously at new joint location. Modify glazing stops as required for new glass size and thickness. Patch frame to match where mullion has been removed, grind smooth and fill with autobody filler to make old joint inconspicuous.

3.4 INSTALLATION

A. General:
   1. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place.
   2. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames:
   1. Install hollow metal frames of size and profile indicated in approved shop drawings.
   2. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
      a. At fire-protection-rated openings, install frames according to NFPA 80.
      b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
      c. Install frames with removable glazing stops located on secure side of opening.
      d. Where frames are to be patched, field splice at locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
      e. Install door silencers in frames before grouting.
      f. Remove temporary braces necessary for installation only after frames have been properly set and secured.
      g. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
      h. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
   3. Fire-Rated Openings: Install frames in accordance with NFPA 80.
   4. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
      a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

   5. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
   6. In-Place Concrete or Masonry Construction:
      a. Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
      b. Grout Solid: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
   7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
   8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
   9. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
      a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
      b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
      c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
      d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
   a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
   b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
   c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
   d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow-metal manufacturer's written instructions.
   1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.5 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

C. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

SECTION 08 14 16 FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Five-ply flush wood veneer-faced doors for transparent finish.
2. Fire-rated wood door frames.
3. Factory finishing flush wood doors.
4. Factory fitting flush wood doors to frames and factory machining for hardware

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door trim for openings.
5. Factory-machining criteria.
6. Factory- finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.
9. Doors to be factory finished and application requirements.

C. Samples:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For door inspector.

1. Submit copy of DHI's Fire and Egress Door Assembly Inspector (FDAI) certificate.

B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Special warranties.

B. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality-control inspections of fire-rated door assemblies shall comply with qualifications set forth in NFPA 80, Section 5.2.3.1 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

B. Egress Door Inspector Qualifications: Inspector for field quality-control inspections of egress door assemblies shall comply with qualifications set forth in NFPA 101, Section 7.2.1.15.4 and the following:

1. DHI's Fire and Egress Door Assembly Inspector (FDAI) certification.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of construction period.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of veneer.
b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors and frames.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flush wood doors and wood paneling from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.

2.3 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S. 1A.

2.4 FIVE-PLY FLUSH WOOD VENEER-FACED DOORS

A. Interior Doors:

1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide doors manufactured by Masonite (Graham Series) or comparable product by one of the following:

a. Eggers Industries.
b. Lambton Doors.
c. Oshkosh Door Company.
d. VT Industries Inc.

2. Performance Grade:
   a. WDMA I.S. 1A Heavy Duty unless otherwise indicated on Drawings.
3. WDMA I.S. 1A Grade: Custom.
4. Faces: Single-ply wood veneer not less than 1/50 inch thick.
   a. Species: White Oak.
   b. Cut: Plain sliced (flat sliced).
   c. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening.
7. Exposed Vertical Edges: Same species as faces or a compatible species – edge Type A.
   a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
   b. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
      1) Screw-Holding Capability: 475 lbf in accordance with WDMA T.M. 10.
8. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
9. Core for Non-Fire-Rated Doors: WDMA I.S. 10 structural composite lumber.
   a. Screw Withdrawal, Face: 700 lbf.
   b. Screw Withdrawal, Edge: 400 lbf.
10. Core for Non-Fire-Rated Doors:
    a. Either glued wood stave or WDMA I.S. 10 structural composite lumber.
11. Construction:
    a. Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.5 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood veneered noncompbustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.6 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated.

1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
2. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

1. Locate hardware to comply with DHI-WDHS-3.
2. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
3. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

2.7 FACTORY FINISHING

A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
2. Finish faces, all four edges, edges of cutouts, and mortises.
3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. WDMA I.S. 1A Grade: Custom.
2. Finish: WDMA I.S. 1A TR-6 Catalyzed Polyurethane.
3. Stain Color: Refer to Interior Finish Legend on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

C. Install frames level, plumb, true, and straight.

1. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
2. Anchor frames to anchors or blocking built in or directly attached to substrates.

a. Secure with countersunk, concealed fasteners and blind nailing.
b. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.

1) For factory-finished items, use filler matching finish of items being installed.

3. Install fire-rated doors and frames in accordance with NFPA 80.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 16 13 - FIBERGLASS DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fiberglass Reinforced Plastic (FRP) Doors.
2. Aluminum Frames for FRP Doors.
a. Provide frames for doors with no sidelights doors. Frames for other doors will be provided as part of the storefront or curtain wall system.

B. Related Sections:
1. Division 08 Section “Aluminum-Framed Entrances and Storefront” for fiberglass doors in storefront system.
2. Division 08 Section “Glazed Aluminum Curtain Walls” for fiberglass doors in this system.
3. Division 08 Section “Door Hardware” for hardware for doors.
4. Division 08 Section “Glazing.” For glass in doors.

1.2 DEFINITIONS

A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.3 REFERENCES

A. ASTM D 523 - Standard Test Method for Specular Gloss.

B. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E 152 - Standard Methods of Fire Tests of Door Assemblies.

E. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

F. SDI 100 - Recommended Specifications for Steel Doors and Frames.

G. UL 10B - Standard for Fire Tests of Door Assemblies.

H. UL 305 - Standard for Panic Hardware.

1.4 PERFORMANCE REQUIREMENTS

A. Door opening assemblies:
1. Maximum flame spread 25 in accordance with ASTM E 84, self-extinguishing in accordance with ASTM D 635.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings:
   1. Plans: Indicate location of each door opening assembly in project.
   2. Elevations: Dimensioned elevation of each type door opening assembly in project; indicate sizes and locations of door hardware, and lites and louvers, if specified.
   3. Details: Installation details of each type installation condition in project; indicate installation details of glazing, if specified.

C. Schedule: Indicate each door opening assembly in project; cross-reference to plans, elevations, and details.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

F. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties.

G. Closeout: Submit warranty documents specified herein.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing fiberglass doors and frames with a minimum documented experience of ten years.

B. Installer Qualifications: Company specializing in installation of fiberglass doors and frames with minimum three years documented experience.

C. Accessible Entrances: Comply with applicable provisions in ICC/ANSI A117.1.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's unopened, undamaged packaging, with manufacturer's labels intact.

B. Inspect and report damage to doors at time of delivery.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store door assemblies in on end, to prevent damage to face corners and edges.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer's 15-year warranty against failure due to corrosion from specified environment.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Product: CF34, FRP Architectural Doors, Inc. Subject to compliance with the requirements for substitutions, products of the following may be considered if colors can be matched.
1. Vale Doors.
2. Special-Lite.

2.2 MATERIALS

A. Fiberglass Mat: Glass fiber chopped strand, minimum 1.5 ounces per square foot.

B. Resins: Manufacturer's formulation for fabricating units to meet specified requirements.

C. Aluminum Extrusions: Alloy and temper recommended by door manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength, not less than 16,000-psi minimum yield strength, and not less than 0.062-inch thickness at any location for the main frame and sash members.

D. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum extrusions and other door components.
1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

E. Anchors: Manufacturer's standard stainless steel expansion anchors for existing openings, and stainless steel masonry tee anchors for new construction.

F. Fasteners: Stainless steel.

G. Glazing: Type specified elsewhere in Division 08; factory installed.

2.3 COMPONENTS

A. Non-rated Fiberglass Reinforced Plastic (FRP) Doors:
1. Thickness: 1-3/4 inches.
2. Thermal Insulating Value: 'R' factor 11.
3. Construction:
a. Internal Frame: Aluminum main frame constructed from extruded aluminum 6063 - T6 alloy. Main frame tube is to be a single extruded unit measuring 1-1/2” x 5-1/2” (O.D.) on both side stiles, and 6" (O.D.) Top and Bottom rails. Spliced extrusions that are joined together to measure 6" will not be accepted.
b. Aluminum Main Frame Wall Thickness:
1) Side Stiles Minimum 3/16" thick hinge edge wall.
2) Top and Bottom Rails Minimum 1/8" thick outside edge wall. (tie rod spline built into tube)
3) All Rails and Stiles Minimum 1/8" thick face walls.
4) All Rails and Stiles Minimum 1/8" thick inside edge wall.
c. Main Frame Joinery: Assembly for the meeting joints of the Rails and Stiles on the main frame are to be mortise & tenon on all four joints:
1) Secured with: 2 Tie Rods in Head Rail and 1 Tie Rod in Bottom Rail
d. Core: Manufacturer’s standard insulated

e. Door Plates: Molded in one continuous piece, resin reinforced with hand-laid glass fiber mat, nominal 1/8 inch thick, minimum 15 mil gel-coated surface.
f. Door Edges: Manufacturer's standard extruded aluminum nominal 3/8 inch thick, and removable to replace door face if damaged.

B. Sizes: Indicated on drawings.

C. Finish: Textured surface.
1. Color:
a. As Selected by Architect from manufacturers full line of standard colors.

D. Trim Finish: Painted to match door face.

E. Exterior Pulls: Fush/recessed and ADA compliant as provided by door manufacturer. Anchor pull to internal door frame.
1. Finish: Clear Anodized.

F. Other Door Hardware: Specified elsewhere in Division 08.

2.4 FRAME FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide compression weather stripping at fixed stops.

E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At exterior doors, provide weather sweeps applied to door bottoms.

F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

2.5 FABRICATION

A. Fiberglass Reinforced Plastic (FRP) Doors:
   1. Minimum glass fiber to resin ratio: 30 percent.
   2. Mortise for lockset, and recess for strike plate in lock stile.
   3. Embed steel reinforcement for hinges in fiberglass matrix; provide for hinge leaf recesses in hinge stile.

B. Reinforcement: Reinforce door for hardware, openings and provide a wide stile concealed frame around entire perimeter. Frame shall be joined by welding or concealed through bolting to create a rigid frame resistant to racking.
   1. Style Width: Minimum 5-1/2 inches.

C. Prepare door for hardware in accordance with hardware schedule.

2.6 ALUMINUM FINISHES

A. Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify openings are ready to receive work and opening dimensions and clearances are as indicated on approved shop drawings. Do not begin installation until openings have been properly prepared.

B. If opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Acclimate doors and frames to site conditions for a minimum of 24 hours before installation.

3.3 INSTALLATION

A. Install door opening assemblies in accordance with approved shop drawings, SDI 100, and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.

B. Use anchorage devices to securely fasten sliding door assembly to wall construction without distortion or imposed stresses.

C. Installation of door hardware is specified elsewhere in Division 08.

D. Install door hardware in accordance with manufacturer's printed instructions, using through-bolts to secure surface applied hardware.

E. Site Tolerances: Maintain plumb and level tolerances specified in manufacturer's printed installation instructions.

3.4 ADJUSTING

A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding, and to remain in place at any angle without being moved by gravitational influence.

B. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.

3.5 CLEANING

A. Clean surfaces of door opening assemblies and sight-exposed door hardware in accordance with manufacturer's maintenance instructions.

B. Remove labels and visible markings.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.7 SCHEDULE

A. Schedules: Refer to Door Schedule indicated on drawings.

END OF SECTION 08 16 13

SECTION 08 31 13 ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.

B. Samples: For each type of access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches in size.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Babcock-Davis.
b. JL Industries, Inc.; a division of the Activar Construction Products Group.
c. Karp Associates, Inc.
d. Larsens Manufacturing Company.
e. Milcor; Commercial Products Group of Hart & Cooley, Inc.

2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Wall and ceiling.
4. Door Size: Size as required to reasonably access required component unless noted otherwise on Drawings.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
6. Frame Material: Same material and thickness as door.

7. Latch and Lock: Cam latch, key operated.

2.2 MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A36.

B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879, with cold-rolled steel sheet substrate complying with ASTM A1008, Commercial Steel (CS), exposed.

C. Frame Anchors: Same material as door face.

D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153 or ASTM F2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.

D. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.
3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.4 FINISHES

A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 08 31 13

SECTION 083313 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Coiling Counter Door (Concessions and Ticketing)

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Curtain slats.
2. Bottom bar with sensor edge.
3. Guides.
4. Brackets.

5. Hood.
6. Locking device(s).
7. Include similar Samples of accessories involving color selection.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 DOOR ASSEMBLY

A. Coiling Counter Door: Overhead coiling door formed with curtain of interlocking metal slats.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Cornell Iron Works, Inc.; Rolling Doors (Model ESD20), or comparable product by one of the following:
   a. Raynor Worlwide.
   b. Cookson Company.
   c. Clopay Building Products.
   d. Overhead Door Company.

2. BOD confirmed length of opening; comparable products must meet that requirement and be able to span the overall length.

3. Door Curtain Material:
   a. Service Door: Stainless Steel

4. Door Curtain Slats: 15/16 inch thick, flat profile.

5. Insulated Bottom Bar: Reinforced extruded aluminum interior face with full depth insulation and exterior skin slat to match curtain material and gauge. Minimum 4 inches tall by 1-1/16 inch thickness.
   a. Finish:
      1. Exterior: Match slats.
      2. Interior: Match slats.

6. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. Service Door Guide Assembly 4-3/4” inch packoff guides.

7. Hood: Stainless

8. Locking Devices: Equip door with locking device assembly and chain lock keeper.
   a. Locking Device Assembly: Lock cylinder.

9. Manual Door Operator:

    a. Provide Manufacturers standard hardware for manual operation crank.

2.2 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

    1. Service Door: Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.3 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

    1. Lock Cylinders: Cylinders specified in Section 087100 "Door Hardware".
    2. Keys: Two for each cylinder.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.4 COUNTERBALANCING MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 MANUAL DOOR OPERATORS

A. General: Equip door with manual door operator by door manufacturer.

B. Push-up Door Operation: Design counterbalance mechanism so that required lift or pull for door operation does not exceed 25 lbf (111 N).

C. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than 25-lbf (111-N) force to turn crank. Fabricate gearbox to be oiltight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.

C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Perform installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Insulated service doors.

B. Related Requirements:

   1. Section 055000 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, and bollards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling door and accessory.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

   1. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
   2. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Special warranty.

B. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide by the following or equal:
1. Basis-of-Design: Raynor Garage Doors, DuraCoil
2. Cornell Cookson, Inc., Model ESD20 Insulated Rolling Service Door (Thermiser)

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:

1. Design Wind Load: As indicated on Drawings.
2. Testing: According to ASTM E330/E330M or DASMA 108 for garage doors and complying with acceptance criteria of DASMA 108.

2.3 DOOR ASSEMBLY

A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.

B. Operation Cycles: Door components and operators capable of operating for not less than 50,000.

C. Insulated Door Curtain R-Value: R-8.0.

D. Insulated Door Assembly U-Factor: U-0.9.

E. Door Curtain Material: Galvanized steel.

F. Door Curtain Slats: Flat profile slats of 3-1/4-inch center-to-center height.
1. Insulated-Slat Interior Facing: Metal.

G. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from hot-dip galvanized steel and finished to match door.

H. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats.

I. Hood: Match curtain material and finish.

1. Mounting: Face of wall.

J. Locking Devices: Equip door with slide bolt for padlock.

K. Electric Door Operator:

1. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
2. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use.
3. Motor Exposure: Interior.
4. Motor Electrical Characteristics:

    a. Horsepower: 1 hp.
    b. Voltage: 115 V ac, single phase, 60 Hz.

5. Emergency Manual Operation: Chain type.
6. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.
7. Control Station(s): Interior mounted.

L. Curtain Accessories: Equip door with weatherseals.

M. Door Finish:
1. Baked-Enamel or Powder-Coated Finish: Custom RAL color.
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.4 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 DOOR CURTAIN MATERIALS AND CONSTRUCTION

A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
1. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E84 or UL 723. Enclose insulation completely within slat faces.
2. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face, with minimum steel thickness of 0.010 inch.

B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.6 HOODS

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

2.7 LOCKING DEVICES

A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

B. Chain Lock Keeper: Suitable for padlock.

C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.8 CURTAIN ACCESSORIES

A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.

B. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.

2.9 COUNTERBALANCE MECHANISM

A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.10 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each door assembly.

1. Electrical Characteristics: Minimum as indicated for each door assembly. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec., without exceeding nameplate ratings or service factor.
2. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.

C. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.

1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

a. Self-Monitoring Type: Four-wire-configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.

D. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

E. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).

F. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

G. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

B. Power-Operated Doors: Install automatic garage doors openers according to UL 325.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Test manual operation of closed door. Reset door-closing mechanism after successful test.

B. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

C. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 08 36 13 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes electrically operated sectional overhead doors in new and existing openings.

B. Related Sections include the following:
1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 DEFINITIONS

A. Operation Cycle: One cycle of a door is complete when it is moved from the closed position to the fully open position and returned to the closed position.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide sectional overhead doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
1. Wind Loads: Refer to code mandated criteria as indicated on the Structural plans.
2. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283.
a. Maximum Rate: 0.08 cfm at 15 mph.
3. R-Value: Minimum 14.8.

B. Operation-Cycle Requirements: Provide sectional overhead door components and operators capable of operating for not less than 10,000 cycles.

1.5 SUBMITTALS

A. Product Data: For each type and size of sectional overhead door and accessory. Include the following:
1. Summary of forces and loads on walls and jambs.

B. Shop Drawings: For special components and installations not dimensioned or detailed in manufacturer's product data.
1. Include field verification of existing and existing modified opening dimensions and clearances.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   1. Panel: 6 inches square.

E. Qualification Data: For Installer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.

B. Source Limitations: Obtain sectional overhead doors through one source from a single manufacturer.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of sectional overhead doors and accessories and are based on the specific system indicated. Other manufacturers' systems with equal performance and dimensional characteristics may be considered. Refer to Division 01 Section "Product Requirements."

PART 2 - PRODUCTS

2.1 STEEL DOOR SECTIONS

A. Construct door sections including face sheets and frames from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, G60 coating designation.
   1. Minimum Base-Metal (Uncoated) Thickness for Section Faces: 0.033 inch.
   2. Exterior-Section Face: Flat.

B. Fabricate door panels from a single sheet to provide sections not more than 24 inches high and nominally 2 inches deep. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
   1. For insulated doors, provide door sections with continuous thermal-break construction, separating faces of door.

C. Enclose open sections with channel end stiles formed from not less than 0.064-inch- thick galvanized steel sheet and weld end stiles to door section in place. Provide intermediate stiles formed from not less than 0.064-inch- thick galvanized steel sheet, cut to door section profile, and welded in place.
   1. Stile Spacing: Not more than 48 inches apart.

D. Reinforce interior door panel sections with continuous horizontal reinforcement, as required to stiffen door and for wind loading. Where door openings exceed span capabilities of standard door panels, provide galvanized steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place.

E. Provide reinforcement for hardware attachment.

F. Thermal Insulation: Insulate inner core of steel sections with door manufacturer's standard polyurethane insulation, foamed in place to completely fill inner core of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following inside facing material, with no exposed insulation material evident:
   1. Inside Facing Material: Zinc-coated (galvanized) steel sheet with a minimum base (uncoated) metal thickness of 0.028 inch.

G. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

H. Man door: Where indicated provide man door integral to sectional door for emergency egress. Door to be constructed of same material as sectional door and include lockset keyed to match sectional door allowing free egress from secure side of door. Provide interlock with motor operator that interrupts operation if door is not closed properly.

I. Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Surface Preparation: Clean galvanized surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants.
      a. Pretreat zinc-coated steel, after cleaning, with a conversion coating of type suited to organic coating applied over it.
   2. Apply manufacturer's standard primer and finish coats to interior- and exterior-door faces after forming, according to coating manufacturer's written instructions for application, thermosetting, and minimum dry film thickness.
      a. Color and Gloss: Architect to select from manufacturers standard colors.

2.2 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized steel track system, sized for door size and weight, designed for lift type indicated and clearances shown, and complying with ASTM A 653/A 653M for minimum G60 zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced at 2 inches apart for door-drop safety device. Slope tracks at proper angle from vertical or design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

B. Track Reinforcement and Supports: Galvanized steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
   1. Support and attach tracks to opening jambs with wall jamb brackets attached to track and attached to wall. Support horizontal (ceiling) tracks with continuous angle welded to track and supported by laterally braced attachments to overhead structural members at curve and end of tracks.
      a. Repair galvanized coating on tracks according to ASTM A 780.

C. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of overhead door.
   1. Provide continuous flexible seals at door jambs for a weathertight installation.

2.3 HARDWARE

A. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.

B. Hinges: Heavy-duty galvanized steel hinges of not less than 0.0747-inch- thick, uncoated steel at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors exceeding 16 feet in width, unless otherwise recommended by door manufacturer.

C. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide 3-inch- diameter roller tires for 3-inch- wide track and 2-inch-diameter roller tires for 2-inch- wide track.
1. Tire Material: Case-hardened steel.

D. Push/Pull Handles: For push-up-operated or emergency-operated doors, provide galvanized steel lifting handles on each side of door.

E. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

2.4 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from oil-tempered-steel wire complying with ASTM A 229/A 229M, Class II, mounted on a cross-header tube or steel shaft. Connect to door with galvanized aircraft-type lift cables with cable safety factor of at least 5 to 1. Provide springs calibrated for a minimum of 10,000 cycles.

B. Cable Drums: Cast-aluminum or gray-iron casting cable drums grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft. Provide one additional midpoint bracket for shafts up to 16 feet long and two additional brackets at one-third points to support shafts more than 16 feet long unless closer spacing is recommended by door manufacturer.

C. Cable Safety Device: Include a spring-loaded, steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either cable breaks.

D. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level shaft and prevent sag.

E. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

2.5 ELECTRIC DOOR OPERATORS

A. General: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycle requirements specified, with electric motor and factory-prewired motor controls, starter, solenoid-operated brake, clutch, remote-

control stations, control devices, integral gearing for locking door, and accessories required for proper operation.

B. Basis of Design Products:
   1. Draw Bar Type : Overhead Door; Model, RHX Heavy Duty Commercial Operator, 1 hp.

C. Comply with NFPA 70.

D. Disconnect Device: Hand-operated disconnect device or mechanism for automatically engaging chain-and-sprocket operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount disconnect device and operator so they are accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

E. Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency auxiliary operator.

F. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70, Class 2 control circuit, maximum 24-V, ac or dc.

G. Door-Operator Type: Unit consisting of electric motor and the following:
   1. Drawbar type, with V-belt primary drive, chain-and-sprocket secondary drive, and quick release for manual operation.

H. Electric Motors: High-starting torque, reversible, continuous-duty, Class A insulated, electric motors complying with NEMA MG 1, with overload protection, sized to start, accelerate, and operate door in either direction from any position, at not less than 2/3 fps and not more than 1 fps, without exceeding nameplate ratings or service factor.
   1. Type: 120V, 1 phase, medium-induction type. At existing location to be replaced match existing voltage and phase.
   2. Service Factor: Comply with NEMA MG 1, unless otherwise indicated.
   3. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
   4. Provide open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
   5. Provide manual general purpose snap disconnect switch sized for motor and indicated voltage at motor for single point connection to power by EC.

I. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop." Unless noted otherwise in special operation locations noted below.
   1. Provide full-guarded, surface-mounted, heavy-duty-type interior unit with general-purpose, NEMA ICS 6, Type 1 enclosure.

J. Obstruction Detection Device: Provide each motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of sensor immediately stops and reverses downward door travel.
   1. Pressure-Sensor Edge: Provide each motorized door with an automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor immediately stops and reverses downward door travel. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
      a. Provide pneumatically actuated automatic bottom bar.
         1) Self-Monitoring Type: Four-wire configured device.

K. Limit Switches: Adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

2.6 DOOR ASSEMBLY FOR OVERHEAD DOORS

A. Steel Sectional Door: Sectional door formed with hinged insulated sections.

B. Basis of Design: Subject to compliance with requirements, provide Overhead Door Corp. Model 591 or comparable listed product by one of the following:
1. Wayne Dalton
2. Raynor Garage Doors

C. Operation Cycles: Not less than 10,000.

D. R-Value: Nominal 15.0 deg F x h x sq. ft./Btu. plus or minus R-0.5.

E. Steel Sections: Zinc-coated (galvanized) steel sheet with G60 zinc coating.
1. Section Thickness: Varies by model noted above.
2. Exterior-Face, Steel Sheet Thickness: 0.015-inch coated thickness.
a. Surface: Manufacturer's standard.
3. Insulation: Foamed in place.
4. Interior Facing Material: Zinc-coated (galvanized) steel sheet of manufacturer's recommended thickness to meet performance requirements for nominal coated thickness.

F. Track Configuration: See drawing for configuration of track with Springs to the rear, mount horizontal track as high to overhead obstructions as possible.

G. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge.

H. Roller-Tire Material: Manufacturer's standard.

I. Locking Devices: Equip door with locking device assembly.
1. Locking Device Assembly: Cremone type, both jamb sides, locking bars, operable from inside with thumbturn and outside with cylinder.

J. Counterbalance Type: Torsion spring.

K. Electric Door Operator:
1. Usage Classification: Medium duty, up to 15 cycles per hour.
2. Operator Type: Draw bar type.
a. Mount operator to clear other obstructions.
3. Motor Exposure: Interior, clean, and dry.
4. Emergency Manual Operation: Push-up type.
5. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar; self-monitoring type.
a. Sensor Edge Bulb Color: Black.
b. Provide cable reel for automatic wire retraction as door raises and lowers.
6. Remote-Control Station: Interior.

L. Door Finish:

1. Baked-Enamel or Powder-Coated Finish: Custom Color as Selected by Architect.
2. Finish of Interior Facing Material: White.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install door, track, and operating equipment complete with necessary hardware, jamb and head molding strips, anchors, inserts, hangers, and equipment supports according to Shop Drawings, manufacturer's written instructions, and as specified.

B. Where openings are reconfigured, provide new attachment blocking for attaching track and seals to frame. Relocate existing motor operators where door is reconfigured. Provide new trolley arm for new door configurations.

C. Fasten vertical track assembly to framing, spaced not less than 24 inches apart. Hang horizontal track from structural overhead framing with angle or channel hangers fastened to framing by welding or bolting or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.

3.2 STARTUP SERVICES

A. Engage a factory-authorized service representative to perform startup services.
1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.3 ADJUSTING

A. Lubricate bearings and sliding parts; adjust doors to operate easily, free from warp, twist, or distortion and with weathertight fit around entire perimeter.

B. Touch-up Painting: Immediately after welding galvanized track to track supports, clean field welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional overhead doors. Refer to Division 01 Section "Closeout Procedures."

END OF SECTION 08 36 13

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Aluminum-framed storefront systems.
2. Aluminum-framed entrance door systems.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
4. Include point-to-point wiring diagrams showing the following:

a. Power requirements for each electrically operated door hardware.
b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data:

1. For Installer and field testing agency.

B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical exterior wall area as shown on Drawings.
2. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures, including, but not limited to, excessive deflection.
b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: Five years from date of Substantial Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:

a. Thermal stresses transferring to building structure.
b. Glass breakage.
c. Noise or vibration created by wind and thermal and structural movements.
d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

C. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

D. Structural: Test according to ASTM E330/E330M as follows:

1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material

failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.

3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

E. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 at a static air pressure differential of 6.24 psf.

F. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501

G. Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

H. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:

1. Glass to Exterior – 0.46 (low-e) or 0.63 (clear) BTU/hr/ft2/°F.

I. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:

1. Glass to Exterior – 60frame and 63glass (low-e) or 60frame and 58glass (clear).

J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.3 STOREFRONT SYSTEMS

A. Basis of Design: Subject to compliance with requirements, provide Kawneer Trifab VersaGlaze 451 & 451T Framing System.

B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Exterior Framing Construction: Thermally improved.
2. Interior Vestibule Framing Construction: Nonthermal.
3. Glazing System: Retained mechanically with gaskets on four sides.
4. Glazing Plane: Front.
5. Finish: Baked-enamel or powder-coat finish.
6. Fabrication Method: Field-fabricated stick system.
7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
8. Steel Reinforcement: As required by manufacturer.

C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 ENTRANCE DOOR SYSTEMS

A. Basis of Design: Subject to compliance with requirements, provide Kawneer Encore system 5-inch sightline.

B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.

1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.

2. Door Design: As indicated.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

a. Provide nonremovable glazing stops on outside of door.

4. Finish: Match adjacent storefront framing finish.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."

a. Accessible Interior Doors: Not more than 5 lbf to fully open door.

B. Weather Stripping: Manufacturer's standard replaceable components.

C. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

D. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.6 GLAZING

A. Glazing: As specified in Section 088000 "Glazing" or Section 088853 "Security Glazing". Refer to Drawings for types and locations.

B. Glazing Gaskets: Comply with Section 088000 "Glazing."

C. Glazing Sealants: Comply with Section 088000 "Glazing."

D. Weatherseal Sealants: As specified in Division 07 Section “Joint Sealants.”

2.7 MATERIALS

A. Sheet and Plate: ASTM B209.

B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.

C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.

D. Structural Profiles: ASTM B308/B308M.

E. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.

F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

2.8 ACCESSORIES

A. Automatic Door Operators: Section 087113 "Automatic Door Operators."

B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

C. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

E. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.9 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. High-Performance Organic Finish, Two-Coat PVDF: Fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat.

1. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
2. Color and Gloss: As indicated within the Exterior Materials Legend on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written instructions.

B. Do not install damaged components.

C. Fit joints to produce hairline joints free of burrs and distortion.

D. Rigidly secure nonmovement joints.

E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

F. Seal perimeter and other joints watertight unless otherwise indicated.

G. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

H. Set continuous sill members and flashing in full sealant bed, as specified in Section 079200 "Joint Sealants," to produce weathertight installation.

I. Install joint filler behind sealant as recommended by sealant manufacturer.

J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.4 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. Install entrance doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

a. Perform a minimum of three tests in areas as directed by Architect.

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

3.6 ENTRANCE DOOR HARDWARE SETS

A. Refer to Door Hardware section.

END OF SECTION

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Sliding doors.
   3. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Automatic operators.
   4. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Division 06 Section “Rough Carpentry”.
   2. Division 06 Section “Finish Carpentry”.
   3. Division 08 Section “Hollow Metal Doors and Frames”.
   4. Division 08 Section “Flush Wood Doors”.
   5. Division 08 Section “Stile and Rail Wood Doors”.
   6. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
   7. Division 08 Section “All-Glass Entrances”.
   8. Division 08 Section “Automatic Door Operators”.

D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards:
   1. ANSI/BHMA Certified Product Standards - A156 Series
   2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      e. Explanation of abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for door hardware.
      g. Door and frame sizes and materials.
      h. Warranty information for each product.
   4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
      c. Wiring instructions for each electronic component scheduled herein.
   2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Proof of Certification: Provide copy of manufacturer(s) official certification or accreditation document indicating proof of status as a qualified and authorized provider of the primary Integrated Wiegand Access Control Products.

E. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

F. Informational Submittals:

1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Procedures.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.

E. Automatic Operator Supplier Qualifications: Power operator products and accessories are required to be supplied and installed through current members of the manufacturer's "Power Operator Preferred Installer" program. Suppliers are to be factory trained, certified, and a direct purchaser of the specified power operators and be responsible for the installation and maintenance of the units and accessories indicated for the Project.

F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.

3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
3. Review sequence of operation narratives for each unique access controlled opening.
4. Review and finalize construction schedule and verify availability of materials.
5. Review the required inspecting, testing, commissioning, and demonstration procedures

J. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship

within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

D. Special Warranty Periods:

1. Ten years for mortise locks and latches.
2. Ten years for extra heavy duty cylindrical (bored) locks and latches.
3. Seven years for heavy duty cylindrical (bored) locks and latches.
4. Five years for standard duty cylindrical (bored) locks and latches.
5. Five years for exit hardware.
6. Five years for manual overhead door closer bodies.
7. Ten years for manual overhead door closer bodies.
8. Fifteen years for manual overhead door closer bodies.
9. Twenty five years for manual overhead door closer bodies.
10. Ten years for heavy duty floor closers.
11. Two years for shallow depth floor closers.
12. Five years for motorized electric latch retraction exit devices.
13. Two years for electromechanical door hardware.

1.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

C. Products furnished, but not installed, under this Section include the following. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.

1. Permanent cylinders, cores, and keys to be installed by Owner.

D. Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

2.2 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
      b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following:
      a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
   5. Manufacturers:
      a. Hager Companies (HA) - CB Series.
      b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - TA Series.
      c. Stanley Hardware (ST) - CB Series.

B. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 certified continuous geared hinge. with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Manufacturers:
      a. Architectural Builders Hardware (ABH)
      b. Hager Companies (HA).
      c. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
      d. Stanley Hardware (ST).

2.3 POWER TRANSFER DEVICES

A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
   1. Manufacturers:
      a. Hager Companies (HA) - ETW-QC (# wires) Option.
      b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC (# wires) Option.

c. Stanley Hardware (ST) – C Option.

B. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
   a. Architectural Builders Hardware (AH) - PT1000-EZ Series.
   b. Securitron (SU) - EL-CEPT Series.
   c. Stanley Hardware (ST) EPT-12C Series.

2.4 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
2. Furnish dust proof strikes for bottom bolts.
3. Surface bolts to be minimum 8” in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
5. Manufacturers:
   a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   b. Trimco (TC).
   c. Architectural Builders Hardware (ABH)

B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
5. Manufacturers:
   a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
   b. Trimco (TC).
   c. Architectural Builders Hardware (ABH)

2.5 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

1. Manufacturers:
    a. Sargent Manufacturing (SA).
    b. No Substitution.

C. Cylinders: Original manufacturer cylinders complying with the following:
1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
5. Keyway: Manufacturer’s Standard.Match Facility Standard. Match Facility Restricted Keyway.

D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
2. Removable Cores: Core insert, removable by use of a special key, and for use with only the core manufacturer's cylinder and door hardware. Provide removable core (small or large format) as specified in Hardware Sets.

E. Keying System: Each type of lock and cylinders to be factory keyed.
1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.
2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
3. Existing System: Field verify and key locks to match Owner's existing system.
4. New System: Key locks to a new key system as directed by the Owner.

F. Key Quantity: Provide the following minimum number of keys:
1. Change Keys per Cylinder: Two (2) Three (3).
2. Master Keys (per Master Key Level/Group): Five (5).
3. Construction Keys (where required): Ten (10).
4. Construction Control Keys (where required): Two (2).
5. Permanent Control Keys (where required): Two (2).

G. Construction Keying: Provide construction master keyed cylinders.

H. Construction Keying: Provide temporary keyed construction cores.

I. Key Registration List (Bitting List):
1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

J. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
1. Manufacturers:
    a. Lund Equipment (LU).
    b. MMF Industries (MM).
    c. Telkee (TK).

2.6 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.
   1. Mortise locks to be certified Security Grade 1.
   2. Extended cycle test: Locks to have been cycle tested in ordinance with ANSI/BHMA 156.13 requirements to 10 million cycles.
   3. Provide status indicators with highly reflective color and wording for “locked/unlocked” or “vacant/occupied” with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1” x 0.6” with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
   4. Provide mortise lock bodies functionally compatible with a rose-less lever trim option.
   5. Manufacturers:
      a. Sargent Manufacturing (SA) – 8200 Series.
      b. No Substitution.

2.7 ELECTROMECHANICAL LOCKING DEVICES

A. Electromechanical Mortise Locksets, Grade 1 (Heavy Duty): Subject to same compliance standards and requirements as mechanical mortise locksets, electrified locksets to be of type and design as specified below.
   1. Electrified Lock Options: Where indicated in the Hardware Sets, provide electrified options including: outside door lock/unlock trim control, latchbolt and lock/unlock status monitoring, deadbolt monitoring, and request-to-exit signaling. Support end-of-line resistors contained within the lock case. Unless otherwise indicated, provide electrified locksets standard as fail secure.
   2. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
   3. High Security Monitoring: Provide lock bodies which have built-in request to exit monitoring and are provided with accompanying door position switches. Provide a resistor configuration which is compatible with the access control system.
   4. Manufacturers:
      a. Sargent Manufacturing (SA) - 8200 Series.
      b. No Substitution.

2.8 AUXILIARY LOCKS

A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.
   1. Manufacturers:
      a. Sargent Manufacturing (SA) - 4870 Series.
      b. No Substitution.

2.9 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.10 ELECTRIC STRIKES

A. Standard Electric Strikes: Electric strikes conforming to ANSI/BHMA A156.31, Grade 1, for use on non-rated or fire rated openings. Strikes shall be of stainless steel construction tested to a minimum of 1500 pounds of static strength and 70 foot-pounds of dynamic strength with a minimum endurance of 1 million operating cycles. Provide strikes with 12 or 24 VDC capability, fail-secure unless otherwise specified. Where specified provide latchbolt and latchbolt strike monitoring indicating both the position of the latchbolt and locked condition of the strike.
   1. Manufacturers:
      a. Folger Adam (FO) - 700 Series.
      b. HES (HS) - 1006 Series.
      c. Von Duprin (VD) - 6200/6400 Series.

2.11 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
   1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
   2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer’s catalog and template book for specific requirements.
   3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
   4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
7. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
8. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
9. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2” wide stiles.
11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
12. Rail Sizing: Provide exit device rails factory sized for proper door width application.
13. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
    1. Manufacturers:
        a. Sargent Manufacturing (SA) - 80 Series.
        b. No Substitution.

C. Extruded Aluminum Removable Mullions: ANSI/BHMA A156.3 anodized, removable mullions with malleable-iron top and bottom retainers. Mullions to be provided standard with stabilizers and imbedded weatherstrip.
    1. Manufacturers:
        a. Sargent Manufacturing (SA) - 980/980A Series.

D. Tube Steel Removable Mullions: ANSI/BHMA A156.3 removable steel mullions with malleable-iron top and bottom retainers and a primed paint finish.
    1. At openings designed for severe wind load conditions due to hurricanes or tornadoes, provide manufacturer’s certified mullion and accessories to meet applicable state and local windstorm codes.
    2. Provide keyed removable feature where specified in the Hardware Sets.
    3. Provide stabilizers and mounting brackets as required.
    4. Provide electrical quick connection wiring options as specified in the hardware sets.
    5. Manufacturers:
        a. Sargent Manufacturing (SA) - 980S Series.

2.12 DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.
4. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
5. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
6. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
7. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.
   1. Manufacturers:
      a. LCN Closers (LC) - 4040 Series.
      b. Sargent Manufacturing (SA) - 351 Series.
      c. Norton Door Controls (NO) - 7500 Series.

2.13 ARCHITECTURAL TRIM

A. Door Protective Trim
   1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
   2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1” LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
   3. Where plates are applied to fire rated doors with the top of the plate more than 16” above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer’s catalog and template book for specific requirements for size and applications.
   4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
      a. Stainless Steel: 300 grade, 050-inch thick.
      b. Brass or Bronze: 050-inch thick.
      c. Laminate Plastic or Acrylic: 1/8-inch thick.

5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
7. Manufacturers:
    a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
    b. Trimco (TC).
    c. Architectural Builders Hardware (ABH)

2.14 DOOR STOPS AND HOLDERS

A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
    1. Manufacturers:
        a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
        b. Trimco (TC).
        c. Architectural Builders Hardware (ABH)

C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
    1. Manufacturers:
        a. Architectural Builders Hardware (AH).
        b. Norton/Rixson Door Controls (RF).
        c. Sargent Manufacturing (SA).

2.15 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
    1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
1. National Guard Products (NG).
2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
3. Reese Enterprises, Inc. (RE).

G. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
1. Manufacturers:
a. Sargent Manufacturing (SA) – 3280 Series.
b. Security Door Controls (SD) - DPS Series.
c. Securitron (SU) - DPS Series.

H. Linear Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw plus 50% for the specified electrified hardware and access control equipment.
1. Manufacturers:
a. Alarm Controls (AK) - APS Series.
b. Corbin Russwin Hardware (RU) - BPS Series.
c. Sargent Manufacturing (SA) - 3500 Series.
d. Security Door Controls (SD) - 630 Series.
e. Securitron (SU) – AQD Series.
f. Von Duprin (VD) - PS.
g. Yale Locks and Hardware (YA) 782.
h. Stanley Best (BE) - Basis Software.
i. No Substitution.
2. Manufacturers:
a. Corbin Russwin Hardware (RU) - WFCD2.
b. Sargent Manufacturing (SA) – WFCD2.

2.16 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.17 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Shop Installation: Install hardware on the doors prior to shipment to the jobsite. Field installed hardware will only be permitted as itemized below. Comply with all other Part 3 installation requirements.

1. Extent of shop installed hardware shall include, but is not limited to:
    a. Hanging devices.
    b. Latching devices.
    c. Operating trim.
    d. Through-door wiring cables.
    e. Door closers and overhead stops.
    f. Flush bolts, surface bolts, and coordinating accessories.
    g. Protective trim – protection plates, edge guards, trim protectors.
    h. Coat hooks, viewers, and all other door mounted accessories.
2. Hardware items which are permitted to be installed in the field include:
    a. Door stops (wall, floor, other mounting).
    b. Frame mounted closer brackets.
    c. Lock and latch strike plates.
    d. Frame wiring cables.
3. Bench test shop installed work. This includes both mechanical and electrical components. Replace defective items.

4. Ship field installed hardware items clearly labeled with the door number and attached to the door using shrink wrap. Include all templates and instructions which are required to complete the installation.

B. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

C. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
   2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

D. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.

E. Power Operator products and accessories are required to be installed through current members of the manufacturer's "Power Operator Preferred Installer" program.

F. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

G. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

H. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Section "Closeout Procedures" for project punch and reporting requirements including compliance with approved submittals and verification door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
B. Clean adjacent surfaces soiled by door hardware installation.
C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
    1. Quantities listed are for each pair of doors, or for each single door.
    2. The supplier is responsible for handing and sizing all products.
    3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate selection for the material and application.
    4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

END OF SECTION 087100

Heading # 01

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	63-8204 x LNL x MK x CKC2	US26D	Sargent	300
1	0	Electric Strikes/Mag Locks	1006CS-12/24D-630	630	Hes	301
1	0	Closer - Parallel Arm with 5th screw	351-CPS	EN	Sargent	500
1	0	Door Position Switch	DPS-M-BK	BK	Securitron	804
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	2005AT x MSES25SS x L.A.R.	A	Pemko	801
1	0	Drip Cap	346C x Dr Width + 4''	C	Pemko	803
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806
1	0	Wiring Harness	QC-C1500P		McKinney	800
1	0	Misc	581-2	EN	Sargent	900
1	0	Power Supply	AQD1		Securitron	901

Note

Door: 106, 113.2, 201, 209.2, 211 Electronic Operation- Secure Side - Presentation of valid credential at card reader (By Others) will release fail secure electric strike allowing access. Non Secure Side - free egress at all times by lever.

Heading # 02

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R. x PT	C	Abh	101
1	0	Push Pad, Rim	56-63-8804 x 862 x 649 x MK x CKC2	US32D	Sargent	302
1	0	Closer - Parallel Arm with 5th screw	351-CPS	EN	Sargent	500
1	0	Door Position Switch	DPS-M-BK	BK	Securitron	804
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	2005AT x MSES25SS x L.A.R.	A	Pemko	801
1	0	Drip Cap	346C x Dr Width + 4''	C	Pemko	803
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806
1	0	Wiring Harness	QC-C1500P		McKinney	800
1	0	Wiring Harness	QC-C30x		McKinney	805
1	0	Misc	581-2	EN	Sargent	900
1	0	Electric Power Transfer	EL-CEPT	US32D	Securitron	902
1	0	Power Supply	AQD1		Securitron	901

Note

Door: C1,C2 Electronic Operation- Secure Side - Presentation of valid credential at card reader (By Others) will signal exit device latch to retract allowing access. Non Secure Side - free egress at all times by exit device.

Heading # 03

Qty Act	Qty Inact	Description		Finish	Mfgr	
0	1	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Continuous Hinge	A110HDC x L.A.R. x PT	C	Abh	101
0	1	Flush Bolt, Extension, Auto	2845	US26D	Rockwood	201
1	0	Mortise Lock - Electric	63-8271 x 24V x LNL x MK x CKC2	US26D	Sargent	303
1	0	Closer - Parallel Arm with 5th screw	351-CPS	EN	Sargent	500
1	1	Door Position Switch	DPS-M-BK	BK	Securitron	804
1	1	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Astragal (T-Style)	355CS x L.A.R.	C	Pemko	807
1	0	Threshold	2005AT x MSES25SS x L.A.R.	A	Pemko	801
1	0	Drip Cap	346C x Dr Width + 4''	C	Pemko	803
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806
1	0	Wiring Harness	QC-C1500P		McKinney	800
1	0	Wiring Harness	QC-C30x		McKinney	805
1	0	Misc	581-2	EN	Sargent	900
1	0	Power Supply	AQD1		Securitron	901

Note

Door: 114,212Electronic Operation- Secure Side - Presentation of valid credential at card reader (By Others) will release fail secure electric lock allowing access. Non Secure Side - free egress at all times by lever.

Heading # 04

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	0	Closer - Parallel Arm with 5th screw	351-CPS	EN	Sargent	500
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	2005AT x MSES25SS x L.A.R.	A	Pemko	801
1	0	Drip Cap	346C x Dr Width + 4''	C	Pemko	803
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806
1	0	Misc	581-2	EN	Sargent	900

Note

Door: 113.1

Heading # 05

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	0	Closer - Parallel Arm with 5th screw	351-P10/O	EN	Sargent	501
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Drip Cap	346C x Dr Width + 4''	C	Pemko	803
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806
1	0	Misc	581-2	EN	Sargent	900

Note

Door: 200,202,209.1,210

Heading # 06

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Deadlock, Mortise	63-4878 x MK	US26D	Sargent	305
1	0	Push Plate	70C-RKW	US32D	Rockwood	400
1	0	Door Pull	BF157 x Type 1XHD	US32D	Rockwood	401
1	0	Closer - Parallel Arm with 5th screw	351-PH10	EN	Sargent	502
1	0	Door Stop	441CU/403	US26D	Rockwood	700
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 213,214

Heading # 07

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
0	2	Flush Bolt, Extension, Manual	555	US26D	Rockwood	200
1	0	Deadlock, Mortise	63-4878 x MK	US26D	Sargent	305
1	1	Push Plate	70C-RKW	US32D	Rockwood	400
1	1	Door Pull	BF157 x Type 1XHD	US32D	Rockwood	401
1	1	Closer - Parallel Arm with 5th screw	351-PH10	EN	Sargent	502
1	1	Door Stop	441CU/403	US26D	Rockwood	700
1	1	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 203,206

Heading # 08

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	V21-63-8257 x LNL x MK x CKC2	US26D	Sargent	306
1	0	Closer - Parallel Arm with 5th screw	351-P10/O	EN	Sargent	501
1	0	Door Stop	441CU/403	US26D	Rockwood	700
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 205,215.2

Heading # 09

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	V21-63-8257 x LNL x MK x CKC2	US26D	Sargent	306
1	0	Closer - Parallel Arm with 5th screw	351-P10/O	EN	Sargent	501
1	0	Concealed Overhead Holder/Stop, Std Duty	1ADJ-x36	630	Norton	701
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 215.1

Heading # 10

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Privacy	V21-8265 x LNL	US26D	Sargent	307
1	0	Closer - Parallel Arm with 5th screw	351-P10/O	EN	Sargent	501
1	0	Concealed Overhead Holder/Stop, Std Duty	1ADJ-x36	630	Norton	701
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 115

Heading # 11

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	0	Concealed Overhead Holder/Stop, Std Duty	1ADJ-x36	630	Norton	701
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 207,208

Heading # 12

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	1	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
0	2	Flush Bolt, Extension, Manual	555	US26D	Rockwood	200
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	1	Concealed Overhead Holder/Stop, Std Duty	1ADJ-x36	630	Norton	701
1	1	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Astragal (T-Style)	355CS x L.A.R.	C	Pemko	807
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 112,204

Heading # 13

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Continuous Hinge	A110HDC x L.A.R.	C	Abh	100
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	0	Closer - Parallel Arm with 5th screw	351-CPS	EN	Sargent	500
1	0	Sweep	315CN x L.A.R.	C	Pemko	802
1	0	Threshold	271A x MSES25SS x L..A.R.	A	Pemko	808
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806
1	0	Misc	581-2	EN	Sargent	900

Note

Door: 110.2

Heading # 14

Qty Act	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Std Wt(.134) Hinge	TA2714-MCK 4-1/2'' x 4-1/2''	26D	McKinney	102
1	0	Mortise Lockset	63-8205 x LNL x MK x CKC2	US26D	Sargent	308
1	0	Door Stop	441CU/403	US26D	Rockwood	700
3	0	Silencer	608-RKW	GRAY	Rockwood	904

Note

Door: 100, 101, 102

Heading # 15

Qty Act	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Std Wt(.134) Hinge	TA2714-MCK 4-1/2'' x 4-1/2''	26D	McKinney	102
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	0	Concealed Overhead Holder/Stop, Std Duty	6ADJ-x36	630	Norton	702
3	0	Silencer	608-RKW	GRAY	Rockwood	904

Note

Door: 105,108

Heading # 16

Qty Act	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Std Wt(.134) Hinge	TA2714-MCK 4-1/2'' x 4-1/2''	26D	McKinney	102
1	0	Mortise Lockset	63-8237 x LNL x MK x CKC2	US26D	Sargent	304
1	0	Door Stop	441CU/403	US26D	Rockwood	700
3	0	Silencer	608-RKW	GRAY	Rockwood	904

Note

Door: 103,107

Heading # 17

Qty Act	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Std Wt(.134) Hinge	TA2714-MCK 4-1/2'' x 4-1/2''	26D	McKinney	102
1	0	Mortise Privacy	V21-8265 x LNL	US26D	Sargent	307
1	0	Closer - Parallel Arm with 5th screw	351-P10/O	EN	Sargent	501
1	0	Kickplate	K1050 x 4BE x CSK x 10'' x 2'' L.D.W.	US32D	Rockwood	600
1	0	Concealed Overhead Holder/Stop, Std Duty	6ADJ-x36	630	Norton	702
3	0	Silencer	608-RKW	GRAY	Rockwood	904

Note

Door: 109

Heading # 18

Qty Act	Qty Inact	Description		Finish	Mfgr	
3	0	5 Hvy Wt(.190) Hinge	T4A3786-MCK 5'' x 4-1/2'' x NRP	26D	McKinney	103
1	0	Mortise Lockset	63-8204 x LNL x MK x CKC2	US26D	Sargent	300
1	0	Electric Strikes/Mag Locks	1006CS-12/24D-630	630	Hes	301
1	0	Closer - Parallel Arm with 5th screw	351-CPS	EN	Sargent	500
1	0	Kickplate	K1050 x 4BE x CSK x 10'' x 2'' L.D.W.	US32D	Rockwood	600
1	0	Wiring Harness	QC-C1500P		McKinney	800
1	0	Power Supply	AQD1		Securitron	901

Note

Door: 103.1 Electronic Operation- Secure Side - Presentation of valid credential at card reader (By Others) will release fail secure electric strike allowing access. Non Secure Side - free egress at all times by lever.

Heading # 19

Qty Act	Qty Inact	Description		Finish	Mfgr	
3	0	4-1/2 Hvy Wt(.180) Hinge	T4A3786-MCK 4-1/2'' x 4-1/2''	26D	McKinney	104
1	0	Mortise Passage	8215 x LNL	US26D	Sargent	309
1	0	Closer - Parallel Arm with 5th screw	351-P10/O	EN	Sargent	501
1	0	Kickplate	K1050 x 4BE x CSK x 10'' x 2'' L.D.W.	US32D	Rockwood	600
1	0	Door Stop	441CU/403	US26D	Rockwood	700
1	0	Gasketing	S88BL x L.A.R.	BL	Pemko	806

Note

Door: 104, 110.1

Heading # 20

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Padlock	63-758-2 x MK x CKC2		Sargent	905

Note

Door: 111,113.3, 113.4,113.5,S1, 200.2, 200.3, 210.3 Balance of hardware by door manufacturer

Heading # 21

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Mortise Cylinder	63-42 x 6-Pin x MK x CKC2	US32D	Sargent	310

Note

Door:200.1,202.1,209.3, 209.4, 210.1,211.1 Balance of hardware by door manufacturer

Heading # 22

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Mortise Cylinder	63-42-101 x 6-Pin x 90 (3/8) x MK x CKC2	US32D	Sargent	311
1	0	Misc	GL1-FLM		Securitron	906
1	0	Misc	FMK-SW		Securitron	907
1	0	Misc	TS-50		Alarm Controls	908
1	0	Power Supply	AQD1		Securitron	901

Note

Door: 210.2, 211.2 Electronic Operation- Secure Side - Presentation of valid credential at card reader (By Others) will release fail secure electric lock allowing access. Non Secure Side - Egress by either card reader or cylinder.Remote push button release to located per owners instructions.

Heading # 23

Qty Act	Qty Inact	Description		Finish	Mfgr	
1	0	Threshold	2715A x PemKote x MSES25SS x L.A.R.	A	Pemko	809
1	0	Padlock	63-758-2 x MK x CKC2		Sargent	905

Note

Door:C1.1, C2.1Balance of hardware by door manufacturer

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass products.
2. Insulating glass.
3. Glazing sealants.
4. Glazing tapes.
5. Miscellaneous glazing materials.

B. Related Requirements:
1. Division 08 “Hollow Metal Doors and Frames” for glazing installed in hollow metal doors and frames.
2. Division 08 “Flush Wood Doors” for glazing installed in wood doors.
3. Division 08 “Aluminum-Framed Entrances and Storefronts” for glazing installed in Aluminum doors and storefront framing.

1.2 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances to achieve proper safety margins for glazing retention under each design load case, load case combination, and service condition.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.

C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Product Certificates: For glass.

B. Product test reports.

C. Preconstruction adhesion and compatibility test report.

D. Sample warranties.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing is not required if data is submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers

1.8 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage

or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:

1. Design Wind Pressures: As indicated on Drawings.
2. Thermal Loads: Design glazing to resist thermal stress breakage induced by differential temperature conditions and limited air circulation within individual glass lites and insulated glazing units.

C. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on most current non-beta version of LBL's WINDOW computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
2. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on most current non-beta version of LBL's WINDOW computer program.
3. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.2 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than thickness indicated.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.3 GLASS PRODUCTS

A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.

B. Low-Iron Annealed Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and SHGC of not less than 0.87.

C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

D. Heat-Strengthened Float Glass: ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

E. Reflective- and Low-E-Coated Vision Glass: ASTM C1376.

F. Ceramic-Coated Spandrel Glass: ASTM C1048, Type I, Condition B, Quality-Q3.

2.4 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Perimeter Spacer: Manufacturer's standard spacer material and construction.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.5 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range of industry colors.

B. Neutral-Curing Silicone Glazing Sealant, Class 50: Complying with ASTM C920, Type S, Grade NS, Use NT.

2.6 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks:

1. EPDM or Silicone with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

C. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

D. Edge Blocks:

1. EPDM or Silicone with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

E. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

F. Obscuring Window Film, Frosted design Window film: 3M Crystal Glass Finishes 7725SE-324, Frosted Crystal film.
1. Etched glass film with acrylic pressure sensitive adhesive backing. 4.7 mil premium vinyl film with matte finish

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.

3.2 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Apply heel bead of elastomeric sealant.

F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

A. Immediately after installation, remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.6 INTERIOR GLASS SCHEDULE

A. Clear Glass Type G-1: Fully tempered float glass.
1. Minimum Thickness: 6 mm.
2. Safety glazing required.

3.7 INSULATING GLASS SCHEDULE

A. Glass Type I-1 - Insulated Glass:
1. Product: PPG Industries, Solarban 60 Solar Control Low E.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Clear fully tempered float glass.
5. Interspace Content: Argon 90%.
6. Indoor Lite: Clear fully tempered float glass.
7. Low-E Coating: Sputtered on second surface.
8. Visible Light Transmittance: 70 percent minimum.
9. Winter Nighttime U-Factor: 0.24 maximum.
10. Summer Daytime U-Factor: 0.22 maximum.
11. Solar Heat Gain Coefficient: 0.39 percent maximum.
12. Outdoor Visible Reflectance: 11 percent maximum.

B. Glass Type SP-1 - Spandrel Glass:
1. Coating Color: Custom color to be selected by architect.
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 6 mm.
4. Outdoor Lite: Clear fully tempered float glass.
5. Interspace Content: Air.
6. Indoor Lite: Clear fully tempered float glass.
7. Coating Location: #2 surface and #3 surface. (Visible from both sides)

END OF SECTION 08 80 00

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:
   1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
      a. Work includes framing for architectural woodworking features and framed ceiling features to receive gypsum wall board.
   2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

B. Related Sections include the following:
   1. Division 05 Section "Cold-Formed Metal Framing" for floor joists, roof joists and partitions exceeding 10 feet in height.
   2. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.
   3. Division 05 Section "Cold-Formed Metal Framing" for horizontal bracing of interior metal stud walls. Walls shall be evaluated based on length (as well as height) and shall not deflect beyond L/240 in both the vertical and horizontal direction based on the application of 5psf of lateral pressure. Brace top of wall as required by stiffening the top track, bracing to underside of roof structure or other approved method. Bracing shall be subject to the requirements of Division 05 Section for Cold-Formed Metal Framing.

C. SUBMITTALS
   1. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Deflection Criteria: Stud depth and thickness shall be selected in accordance with manufacture published span data and shall comply with the following deflection criteria:
   1. Typical walls: L/240.
   2. Walls with ceramic tile: L/360.

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with AISI S220 for conditions indicated.

1. Steel Sheet Components: Comply with AISI S220 requirements for metal, unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Contractor's option, subject to dimensional limitations indicated on plans, to employ one or both of the following systems as specified herein.
1. Conventional carrying channels and furring.
2. Grid suspension system.

B. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

C. Hanger Attachments to Concrete:
1. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

D. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch diameter.

E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base metal thickness of 0.0538 inch, a minimum 1/2-inch-wide flange, with ASTM A 653, G40, hot-dip galvanized zinc coating; depth as needed to support impose loads, but not less than the following:
1. Overhead Structural Support Spacing up to 4 Feet: 1-1/2 inches.
2. Overhead Structural Support Spacing Between 4 Feet and 6 Feet: 2-1/2 inches.
3. Overhead Structural Support Spacing Between 6 Feet and up to 10 Feet: 4 inches.

F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
a. Minimum Base Metal Thickness: 0.0312 inch.

G. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; 640-C Drywall Furring System.
c. USG Corporation; Drywall Suspension System.
3. Supplemental Supports: In locations where building structural elements supporting ceiling suspension systems are spaced more than 48 inches o.c. and where obstructions or other conditions prevent support of ceiling suspension systems at 48 inches o.c. or less, provide cold-formed metal framing to support ceiling systems to comply with specified standards, with depth of supplemental framing members not less than the following:
a. Overhead Structural Support Spacing up to 4 Feet: 1-1/2 inches.
b. Overhead Structural Support Spacing Between 4 Feet and 6 Feet: 2-1/2 inches.

c. Overhead Structural Support Spacing Between 6 Feet and 10 Feet: 4 inches.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645; depth 3-5/8 inches unless otherwise indicated; thickness as follows: 33 mils / 0.0329 inch thickness (20 gauge), unless otherwise indicated or required by referenced standards to support indicated loads within maximum deflections specified.
1. 20 gauge 'Equivalent' products (less than 33 mils / 0.0329 inch thickness) are not acceptable in the following applications:
a. For studs supporting wall-mounted items.
b. For studs in partitions that are not braced or secured at top.
c. At fire door frames.
d. Corridor walls.
e. Walls in excess of 10 feet in total height.
f. Walls with cement board, ceramic tile or stone tile finish.
g. Walls with abuse resistant or high impact drywall.
h. Where indicated.

B. Slip-Type Head Joints: Where indicated, provide the following:
1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
a. Products: Subject to compliance with requirements, provide one of the following:
1) Steel Network Inc. (The); VertiClip SLD and Vertitrack VTD.
2) Superior Metal Trim; Superior Flex Track System (SFT).
3) Dietrich Metal Framing, Sliptrack Systems; SLP-TRK.

C. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
2. Products: Subject to compliance with requirements, provide one of the following:
a. Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
b. Metal-Lite, Inc.; The System.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0312 inch.

E. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base Metal Thickness: 0.0179 inch.
2. Depth: 7/8 inch.

G. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: 3/4 inch.
2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch- diameter wire, or double strand of 0.0475-inch- diameter wire.

2.4 LOW WALL/ PARTIAL HIEGHT FRAMING CONNECTOR

A. General: Provide support for out of plane loading of catilevered partial wall systems that are unsupported at the top track. Out of plane loads are transferred to floor system through the base plate, which is welded to the Pony Wall Heavy stud member.
   1. Provide Basis-of-Design Product or equal by ClarkDietrich, Pony Wall Heavy.
      a. Plate Material: ASTM A36 ½" thick hot rolled steel.
      b. Stud Material: ASTM A1011 SS Grade 50, 50 ksi, 12 ga.
      c. Coating: Powder coat or Galvanized
      d. Plate Dimensions: 3 3/8 inch x 8 inch x ½ inch
      e. Stud Dimension: 3 5/8 inch x 2 ½ inch x (confirm with wall height)
      f. Spacing: space as shown on drawings or not less than 1 unit for every 48 inches of unsupported top track.
      g. Fasteners: 1/2" inch diameter Hilti KB1 Expansion anchor with 3 5/8 inch embedment for concrete slab on grade. On suspended slab thru bolt with backer plate on under side of metal deck unless noted otherwise on drawings. Backer plate to be not less than 12 inch by 12 inch by 1/4 inch steel.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:
   1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
   2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
   1. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
   2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.

3. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.3 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
5. Do not attach hangers to steel roof deck.
6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
8. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install studs so flanges within framing system point in same direction.
   1. Space studs as follows:
      a. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
      b. Multilayer Application: 16 inches o.c., unless otherwise indicated.
      c. Tile backing panels: 16 inches o.c., unless otherwise indicated.

C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb, unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
   3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
      a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

A. Direct Furring:
   1. Apply furring to existing and new masonry walls out of plumb and not suitable for direct lamination of gypsum wall board, backing board or cement board to masonry surfaces.
   2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

B. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels. (Cement Board)
3. Drywall aluminum trims & reveals

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of trim accessory indicated.

C. Samples for Verification: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Build mockups for the following:
   a. Each level of gypsum board finish indicated for use in exposed locations.
2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
3. Simulate finished lighting conditions for review of mockups.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. CertainTeed Gypsum, Saint Gobain
   b. Georgia-Pacific Gypsum LLC.
   c. PABCO Gypsum.
   d. USG Corporation.

2.4 INTERIOR GYPSUM BOARD

A. Gypsum Board, Type X: ASTM C1396/C1396M.

1. Thickness: 5/8 inch, unless noted otherwise on the drawings.

2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, the panels meet or exceed ASTM C1396.
4. Basis of Design:
    a. USG USG SHEETROCK® BRAND - MOLD TOUGH® - FIRECODE® X PANELS

B. Sound Dampening Gypsum Panel

1. Core: 5/8 inch, Type X
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
4. Basis of Design:
    a. PABCO Gypsum – Quietrock EZ-Snap MR

C. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Thickness: 1/2 inch, unless noted otherwise on the drawings.
    a. If required to achieve radius at curved soffits 2 layers of 1/4 inch may be used.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, the panels meet or exceed ASTM C1396.
4. Basis of Design:
    a. USG SHEETROCK® BRAND AQUA TOUGH AR PANELS®

2.5 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.
1. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, the panels meet or exceed ASTM C1396.
4. Basis of Design:
    a. USG SHEETROCK® BRAND MOLD TOUGH® PANELS FIRECODE® C

2.6 TILE BACKING PANELS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
    a. CertainTeed Corporation.
    b. Custom Building Products.
    c. James Hardie Building Products, Inc.
    d. National Gypsum Company.
    e. USG Corporation.

B. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.

1. Core: 5/8 inch, Type X.
2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
3. Basis of Design:
    a. USG DUROCK™ BRAND - GLASS-MAT TILE BACKERBOARD

C. Cementitious Backer Units (Cement Board): ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Thickness: 5/8 inch
2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
    a. Basis of Design:
        1) USG Durock® Brand Cement Board with EdgeGuard™

2.7 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material:
    a. Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
    a. Cornerbead, typical
        1) Basis of Design: USG Sheetrock® Brand - Paper-Faced Metal Corner Bead - 30 year Warranty
    b. Cornerbead, above 8’-0”
        1) Basis of Design: Certainteed No-Coat Drywall Corner
    c. LC-Bead: J-shaped; exposed long flange receives joint compound.
    d. L-Bead: L-shaped; exposed long flange receives joint compound.
    e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    f. Expansion (control) joint.
    g. Curved-Edge Cornerbead: With notched or flexible flanges.
    h. Zip-Strip at Material Transitions
        1) Basis of Design: ClarkDietrich – Rip Bead L-Bead
    i. Curved-Edge Cornerbead: With notched or flexible flanges

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Basis of Design:
    a. Manuf.: Fry Reglet
    b. Product: Where indicated in drawings.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 (ASTM B221M), Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified, unless noted otherwise.
4. GWB Reveal Trims
    a. Color: Standard Powder Coat Options
    b. Typical Shapes:
        1) Drywall Reveal Molding – ½” wide, unless noted otherwise
        2) Drywall “Z” Reveal
            a) ½” wide, unless noted otherwise
            b) 2” wide, where drywall finish meets stone veneer
        3) Drywall “F” Reveal
        4) Reveal Picture Hanger
        5) “L” Trim Molding
        6) Refer to drawings for additional shape products.

2.8 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475/C475M.

B. Joint Tape:
1. Interior Gypsum Board: Paper.
2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Tile Backing Panels:

1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.9 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

A. Comply with ASTM C840.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form control and expansion joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
   1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
   2. Fit gypsum panels around ducts, pipes, and conduits.
   3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

K. Metal Stud Requirements at Abuse Resistant, Impact Resistant and Tile Backer Board / Cement Board installations over Metal Studs:
1. Verify metal studs meet 33 mils, 0.032 inch minimum design thickness (actual 20 gauge, not equivalent product).
2. Submit drywall manufacture product data regarding screw pull-out strength requirements.

3.3 INSTALLATION SCHEDULE FOR INTERIOR GYPSUM BOARD

A. Installation Schedule:
1. Gypsum Board:
   a. Typical at walls in areas not required to have tile finish.
      1) Type X: Typical for locations not noted below.
      2) Mold Resistant: Use in toilet rooms, Janitor Closets and next to sinks.
      3) Sound Dampening: Use on Office and Conference Room walls both sides.
2. Tile Backer Panels: At ceramic tile finish applications.
3. Ceiling Gypsum Board:
   a. Typical at ceilings & soffits applications.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
   a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
   b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods:
   a. Apply gypsum panels to supports with steel drill screws.
   b. Fastening methods to meet drywall manufacturer’s requirements.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over

furring members.

4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written instructions and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
   1. Core: 5/8 inch, Type X.
   2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

B. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.
   1. Thickness: 5/8 inch
   2. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
   1. Fastening Methods:
      a. Apply gypsum panels to supports with cement board screws.
      b. Fastening methods to meet drywall manufacturer’s requirements.

3.5 INSTALLATION OF TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Control Joints: Install control joints at locations indicated on Drawings or if not indicated install in walls greater than 30 feet in length.

C. Interior Trim: Install in the following locations:

   1. Cornerbead: Use at exposed drywall corners, unless noted otherwise.
   2. LC-Bead: Use at exposed drywall panel edges.
   3. L-Bead: Use where indicated.
   4. Curved-Edge Cornerbead: Use at curved openings.
   5. Material Transitions: Use ‘zip-strip’ where gypsum wall board meets other finishes.
   6. Drywall Reveals & Trims:
      a. Refer to drawings for locations & size of reveal trim.

3.6 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations,

fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile and panels that are substrate for acoustical tile.
1. Level 3: Areas scheduled to receive heavy or medium texture finishes before final painting, or where heavy grade wall coverings will be applied as final decoration.
2. Level 4: At impact resistant and abuse resistant boards and panel surfaces that will be exposed to view unless otherwise indicated.
   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."
3. Level 5: Where indicated on Drawings and feature downlit walls.
   a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Floor Tile
2. Wall Tile
3. Metal Edge Protection Trim (metal edge strips)
4. Crack Isolation Membrane
5. Waterproof Membrane
6. Stone Thresholds

B. Related Requirements:

1. Section 033000 “Cast-in-place Concrete”.
2. Section 092900 "Gypsum Board" – Tile Backer Panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed Work.
3. Full-size units of each type of trim and accessory for each color and finish required.

4. Stone thresholds in 6-inch lengths.
5. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

C. Product Certificates: For each type of product.

D. Product Test Reports: For tile-setting and -grouting products.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Build mockup of each type of wall tile installation.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.

1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
2. Obtain crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.

B. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:

1. Stone thresholds.
2. Crack isolation membrane.
3. Metal edge strips.

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 WALL AND FLOOR TILE PRODUCTS

A. Refer to “Finish Legend” on drawings for manufacturers, products, styles, and colors.

1. Tile products to comply with ANSI A137.1.

2. Verify that Floor Tile products comply with Dynamic Coefficient of Friction (DCOF) values:
   a. Interior Wet & Level Spaces / Shower Floors: Greater than or equal to 0.42.
   b. Ramps & Inclines (Non-Level Floors): Greater than or equal to 0.65.

2.4 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Marble Thresholds: ASTM C 503/C 503M, with a minimum abrasion resistance of 10 according to ASTM C 1353 or ASTM C 241/C 241M and with honed finish.

1. Description: Uniform, fine- to medium-grained
   a. Color: White stone with gray veining, unless noted otherwise.

2.5 METAL EDGE PROTECTION TRIM

A. Metal Edge Protection Trim: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Basis-of-Design Manuf.: Schluter Systems
   b. Or equal products by:
      1) Profilitec
      2) Blanke Corporation.
      3) Ceramic Tool Company, Inc.

B. Installation – Refer to drawings.

2.6 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

B. Type as specified in Section 092900 "Gypsum Board."
1. Thickness: 5/8 inch, unless indicated otherwise.

2.7 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include

reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
   1. Manufacturers - Basis-of-Design Product: Subject to compliance with requirements, provide:
      a. #9240 Crack Isolation Fabric-Reinforced, Fluid-Applied membrane by Custom Building Products
      b. Or comparable product by manufacturers listed below:
         1) Bostik, Inc.
         2) LATICRETE INTERNATIONAL SUPERCAP, LLC.
         3) MAPEI Corporation.
      c. Summitville Tiles, Inc.

2.8 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane:
   1. System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
   2. Manufacturers - Basis-of-Design Product: Subject to compliance with requirements, provide:
      a. #9240 Crack Isolation Fabric-Reinforced, Fluid-Applied membrane by Custom Building Products
      b. Or comparable product by manufacturers listed below:
         1) Bostik, Inc.
         2) LATICRETE INTERNATIONAL SUPERCAP, LLC.
         3) MAPEI Corporation.
         4) Summitville Tiles, Inc.

2.9 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI 118.4

   1. Manufacturers - Basis-of-Design Product: Subject to compliance with requirements, provide:
      a. Versa Bond Professional Thin-set or Pro-Lite Premium Tile Mortar by Custom Building Products
      b. Or comparable product by manufacturers listed below:
         1) ARDEX Americas.
         2) Bonsal American, an Oldcastle company.
         3) LATICRETE INTERNATIONALSUPERCAP, LLC.
         4) MAPEI Corporation.
   2. Provide prepackaged, dry-mortar mix containing dry, re-dispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
   3. For wall applications, provide mortar that complies with requirements for non-sagging mortar in addition to the other requirements in ANSI A118.15.

2.10 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.

B. High-Performance Tile Grout: ANSI A118.7.

1. Manufacturers - Basis-of-Design Product: Subject to compliance with requirements, provide:
   a. Prism Ultimate Performance Grout by Custom Building Products
   b. Or comparable product by manufacturers listed below:
      1) LATICRETE INTERNATIONALSUPERCAP, LLC.
      2) MAPEI Corporation.
      3) Summitville Tiles, Inc.
2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, re-dispersible form, prepackaged with other dry ingredients.

C. Provide verification for compatibility of grout materials with tile products selected.

2.11 MISCELLANEOUS MATERIALS

A. Trowel-able Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Vapor-Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils thick.

C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

D. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Bonsal American, an Oldcastle company.
   b. Custom Building Products.
   c. Jamo Inc.
   d. Southern Grouts & Mortars, Inc.
   e. Summitville Tiles, Inc.

2.12 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and

other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
    a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
    b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowel-able leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where areas have floor drain, prepare substrates and provide waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation

methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile floors consisting of tiles 8 by 8 inches or larger.
    c. Tile floors consisting of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Ceramic Mosaic Tile: 1/16 inch.
2. Quarry Tile: 1/4 inch.
3. Pressed Floor Tile: 1/4 inch.
4. Glazed Wall Tile: 1/16 inch.
5. Porcelain Tile: 1/4 inch, or per manuf. recommendations.

H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

J. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in improved modified dry-set mortar (thinset).
2. Do not extend crack isolation membrane under thresholds set in improved modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on crack isolation membrane with elastomeric sealant.

K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

L. Floor Sealer: Apply floor sealer to grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

B. Comply with Section 092900 "Gypsum Board."

3.5 INSTALLATION OF WATERPROOF MEMBRANE

A. Install waterproof membrane to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.

B. Allow waterproof membrane to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

C. Provide crack isolation membrane to allow adjustment of control joints and construction pour joints, typical.

1. Soft joint sealant to be located at near full tile grout joint.

3.7 ADJUSTING AND CLEANING

A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.

B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove grout residue from tile as soon as possible.
2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.8 PROTECTION

A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.

B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Tile installations to meet Tile Council of North America (TCNA) requirements.

B. Interior Floor Installations:

1. Concrete Subfloor
   a. TCNA F122
      1) Bonded Waterproof Membrane
         a) Extend up perimeter wall surfaces 6 inches min.
      2) Thinset Mortar: Modified or Improved Modified Dry-Set Mortar.
      3) Grout: High performance cement unsanded grout.

C. Interior Wall Installations:

1. Masonry or Concrete:
   a. TCNA W202 (Thin-Bed Direct Bond)
      1) Thinset Mortar: Modified or Improved Modified Dry-Set Mortar.
      2) Grout: High performance cement unsanded grout.

END OF SECTION 09 30 13

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes products for interior ceiling systems:

1. Acoustical Panels

2. Exposed Suspension Systems

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For components with factory-applied finishes.

C. Samples for Verification:
1. Acoustical Panels: Set of 6-inch-square Samples of each type, color, pattern, and texture.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.
   a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
6. Items penetrating finished ceiling and ceiling-mounted items.
7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.

8. Minimum Drawing Scale: 1/8 inch = 1 foot.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Acoustical Ceiling Units: Full-size panels equal to three (3) percent of quantity installed, round quantity up to full box.
2. Suspension-System Components: Quantity of each exposed component equal to two (2) percent of quantity installed, round up to full box.

1.8 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.

B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.

C. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
1. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Meetings."

E. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
1. Pressurized Plenums: Where mechanical system is applicable to project, operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 50 or less.

C. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS

A. Manufactures:
1. Subject to compliance with requirements, provide products:
a. Per Interior Finish information in the Construction Drawings,
b. Or provide comparable acoustical panel ceiling system by one of the following:
1) Armstrong World Industries, Inc.
2) CertainTeed Corp.; Saint-Gobain
3) USG Interiors, Inc.

B. Description:
1. Color: Match Basis-of-Design product, if not indicated then provide White.
2. Light Reflectance (LR): Match Basis-of-Design product, if not indicated then provide LR 0.85 minimum.
3. Ceiling Attenuation Class (CAC): Match Basis-of-Design product, if not indicated then provide CAC 30 minimum.
4. Noise Reduction Coefficient (NRC): Match Basis-of-Design product, if not indicated then provide NRC 0.70 minimum.
5. Articulation Class (AC): Match Basis-of-Design product, if not indicated then provide AC 170 minimum.
6. Edge/Joint Detail: Match Basis-of-Design product, if not indicated then provide reveal sized to fit flange of exposed suspension-system members
7. Thickness: Match Basis-of-Design product, if not indicated then provide 3/4 inch minimum.
8. Modular Size: Match Basis-of-Design product, if not indicated then provide 24 by 48 inches.
9. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.
10. Sag Resistance: Equivalent to Armstrong "HumiGuard Plus No Sag Warranty”.

2.4 METAL SUSPENSION SYSTEM

A. Basis of Design Product: Subject to compliance with requirements, provide the following products as manufactured by Armstrong World Industries, Inc.:
1. Prelude XL 15/16 inch Exposed Tee
a. Install at typical locations, unless noted otherwise.
2. Prelude XL for Exterior Conditions, 15/16 inch Exposed Tee
a. Heavy-duty G90 hot-dipped galvanized steel with/without an aluminum cap, built to handle structural load and wind uplift considerations
b. Install at sheltered non-exposed outdoor areas, including indoor areas exposed to exterior elements
1) Install at interior spaces with rolling doors / overhead coiling door systems through exterior wall.

3. Refer to Drawings / Finish Legend for additional information.

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.

1. Manufacture of suspension system to match acoustical panel manufacture for maximum warranty protection.
2. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
    a. Provide at unconditioned spaces.

C. Wide-Face, Capped, Double-Web, Class A Fire-Rated, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; pre-painted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch-wide metal caps on flanges.
1. Structural Classification: Intermediate-duty system.
2. End Condition of Cross Runners: Butt Edge type.
3. Face Design: Flat, flush.
4. Cap Material:
    a. Cold-rolled steel, typical
    b. Provide Aluminum at the following locations where applicable to project:
        1) Kitchen Service Areas
        2) Areas that may be ‘unconditioned’ throughout the year.
5. Cap Finish: Painted white, unless otherwise noted.

2.5 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E488/E488M or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, conducted by a qualified testing and inspecting agency.
3. Stainless-steel Components: ASTM F 593 and ASTM F 594; for ceilings located in wet areas as follows:
    a. Applications: Shower Areas, kitchens and Dishwashing Areas: Alloy 304 or 316.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
    a. Application: Typical locations.
2. Nickel-Copper-Alloy Wire: ASTM B164, nickel-copper-alloy UNS No. N04400.
    a. Application:
        1) Wet areas including shower areas, kitchens and dishwashing areas.
        2) Unconditioned spaces
3. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch-diameter wire.

C. Universal Hold Down Clips
1. Provide at interior areas exposed to exterior elements, ie. wind uplift.

2.6 METAL EDGE MOLDINGS AND TRIM

A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
   1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
   2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

B. Extruded-Aluminum Edge Moldings and Trim:
   1. Where indicated in drawings, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements.
      a. Finish: If not indicated in drawings, Architect to select for manufacture’s standard finish options.

2.7 ACOUSTICAL SEALANT

A. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer’s printed recommendations.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

C. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.
   1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
   4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
   6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
   7. Do not attach hangers to steel deck tabs.
   8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
   9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
   10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

   1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
   2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
   3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
   1. Arrange directionally patterned acoustical panels as follows:
      a. Install panels with pattern running in one direction parallel to [long] [short] axis of space.
   2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
   3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
   4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
   5. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
   6. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
   7. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of non-cumulative.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thermoset-rubber base.
2. Rubber molding accessories.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples.

C. Product Schedule: For resilient base and accessory products.
1. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials[, from the same product run,] that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
3. Stair Tread & Riser installation mock-ups:
a. GC to have pre-installation meeting(s) with Architect and product representative to review substrate conditions.
b. Mockups to confirm the following:

1) Stair products are scribed to meet conditions, including:
   a) Steel stringers
   b) Masonry walls
2) Review construction to meet building code requirements for riser heights and tread depths of individual steps and full stair runs.
3) Where installing products in existing buildings, review substrate preparation of existing conditions, including:
   a) Cementitious molding products to repair stair nosing where ex. metal nosing product is removed. Minimize use of stair nosing filler.
   b) Cementitious patching of substrate for receiving new finishes.
   c) Adherence of stair products to substrates, including existing angled metal & angled concrete riser conditions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.7 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

A. Comply with Division 01 requirements for substitutions of basis of design products.
   1. Acceptable Manufactures:
      a. Roppe
      b. Tarkett-Johnsonite
   2. Product: If product not indicated in drawings, provide:
      a. Roppe – Pinnacle Rubber Base

B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
   1. Style: Standard Toe, unless noted otherwise in drawings.
   2. Height: 4 inches, unless noted otherwise in drawings

3. Lengths: Coils in manufacturer's standard length

C. Corners
1. Outside Corners: Job formed
2. Inside Corners: Job formed
3. Refer to drawings for manuf. molded ‘corner blocks’ where applicable.

D. Colors: Refer to drawings, if not indicated, to be selected from manufacture’s full range of color products.

2.2 RUBBER MOLDING ACCESSORY

A. Basis of Design: Match Rubber Base manufacturer.

B. Description:
1. Rubber reducer strip for resilient floor covering
2. Rubber joiner for tile and carpet
3. Rubber transition strips
4. Rubber reducer strips

C. Locations, Profile and Dimensions: As noted on Interior Finish – Floor Transition Types schedule, if not indicated provide the following, or similar, & coordinate sectional profiles w/ adjacent floor finishes:
1. Resilient Tile > Carpet Tile:
   a. Roppe - Rubber #50 Tile/Carpet Joiner
2. Resilient Tile > Carpet Walk-Off:
   a. Roppe - #65 / #73 Rubber Rolling Traffic Transition
3. Resilient Tile > Concrete Substrate / Exist. Terrazzo Flooring:
   a. Roppe – Vinyl #168 Underslung Reducer
4. Resilient Tile > Rubber Athletic Flooring (3/8” thick):
   a. Roppe - #66 / #67 Rubber Rolling Traffic Transition

D. Colors and Patterns: Refer to drawings, if not indicated, then match adjacent rubber base.

E. ADA Compliant: Accessories to meet ANSI/ADA compliance requirements.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives:
1. Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
2. Where installed over ceramic tile or glazed/polished masonry, provide Contact Adhesive for non-porous substrates.
   a. Prepare substrate per manufacturer’s recommendations for a ‘smooth’ finish installation that meets adherence requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.
   1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Do not install resilient products until materials are the same temperature as space where they are to be installed.

   1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

C. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Job-Formed Corners:
   1. Outside Corners:
      a. Use straight pieces of maximum lengths possible and form with returns not less than 6 inches in length.
         1) Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches in length.
3. When using thick sculpted wall base, job-site formed corners are made similar to wood baseboard and wood molding. Use the Miter-Saw or D-Cut Mitering Methods for inside and outside corners. The use of the Coping Method is recommended for inside corners that are not square or plumb.
    a. Miter or cope corners to minimize open joints.
    b. Thick sculpted products include resilient base with any part of its profile thicker than 0.125 inches.

H. Where installing resilient products over non-porous substrate (ie. Ceramic Wall Tile, Glazed / Polished Masonry):
1. Prep (abrade) non-porous surface per manufacturer's recommendations.
2. Fill cracks, voids, divots, grout lines with a cementitious patching compound, similar to:
    a. Uzin 886
3. Attach with adhesive per manufacturer's recommendations, similar to:
    a. Roppe C-630 Contact Adhesive for non-porous substrates

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:
1. Remove adhesive and other blemishes from surfaces.
    a. Remove 'mold release' residue, used by manufacture during fabrication, from finish surface of installed product.
2. Sweep and vacuum horizontal surfaces thoroughly.
3. Damp-mop horizontal surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
1. Provide if recommended by product manufacture in number of coats recommended.
    a.
2. Polish is not intended for Rubber TS products.

E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:
   1. Solid Vinyl Tile

B. Related Sections:
   1. Division 03 Section - Hydraulic Cement Underlayment

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of resilient floor tile.
   1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   2. Show details of special patterns.

C. Samples: Each color, texture, and pattern of floor tile required.

D. Samples for Initial Selection: For each type of floor tile indicated.

E. Samples for Verification: Full-size units of each color and pattern of floor tile required.

F. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:
   1. An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
   2. Contractors for floor covering installation should be experienced in managing commercial flooring projects and provide professional installers, qualified to install the various flooring materials specified.
   3. An installer is “qualified” if one of the following:
      a. Trained or a certified by product manufacturer
      b. Certified a INSTALL (International Standards & Training Alliance) resilient floor covering installer.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
   1. Coordinate mockups in this Section with mockups specified in other Sections.
      a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

A. Install resilient products after other finishing operations, including painting, have been completed.

B. Maintain ambient temperatures within range recommended by manufacturer, but not less than 65 deg F or more than 85 deg F, in spaces to receive floor tile during the following periods:
   1. 48 hours before installation.
   2. During installation.
   3. 48 hours after installation.

C. Maintain the ambient relative humidity between 40% and 60% during installation.

D. Close spaces to traffic during floor tile installation.

E. Close spaces to traffic for 48 hours after floor tile installation.

F. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 SOLID VINYL TILE

A. Manuf. / Product: Refer to Interior Finish drawings, legends & schedules.

B. Tile Standard: ASTM F 1700, Class 1, Type A, Smooth surface

C. Thickness/Wearlayer: 0.080 inch, minimum

D. Tile size: As selected by Architect from full range of industry standard sizes.

E. Colors and Patterns: As selected by Architect from full range of industry colors.

F. Test data:
   1. Total thickness (ASTM F386): 0.080 inches (2 mm)
   2. Flexibilty (ASTM F137): Passes
   3. Chemical Resistance (ASTM F925): Passes
   4. Static Load Limit (ASTM F970): Passes 250 psi
   5. Resistance to Heat (ASTM F1514): $\Delta E \leq 8$
   6. Resistance to Light (ASTM F1515): $\Delta E \leq 8$
   7. Size, Tolerance (ASTM F2055): Passes
   8. Static Coefficient of Friction (ASTM D 2047): ≥ 0.5 SCOF
   9. Flamability (ASTM E648, Critical Radiant Flux): Class 1 (≥ 0.45 W/cm^2)
   10. Limited Commercial Warranty: 10 years, minimum

2.3 INSTALLATION MATERIALS

A. Cementitious Self Leveling and Trowelable Patching Compounds
   1. Refer to Spec. Division 03 Section - Hydraulic Cement Underlayment

B. Adhesives:
   1. Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
   2. Provide product recommended by floor product manufacturer to meet site conditions.

C. Bonding Agent:

1. Substrate surface to meet “Roughness Profile” or Concrete Surface Profile, refer to product manufacturer’s requirements.

D. Floor Polish: Provide protective, liquid floor-polish products where recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to flooring manufacture’s written instructions to ensure proper adhesion of Resilient Flooring.

B. Concrete Substrates: Prepare according to ASTM F710.
1. Concrete floors must be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, film-forming curing compounds, silicate penetrating curing compounds, sealing, hardening or parting compounds, alkaline salts, excessive carbonation or laitance, mold, mildew, and other foreign materials that may affect dissipation rate of moisture from the concrete, discoloration or adhesive bonding.
2. Mechanically remove contamination on the substrate that may cause damage to the resilient flooring material. Permanent and non-permanent markers, pens, crayons, paint, etc., must not be used to write on the back of the flooring material or used to mark the substrate as they could bleed through and stain the flooring material.
3. Moisture Testing
    a. Perform moisture testing as recommended by manufacturer.
    b. Proceed with installation only after substrates have been tested and meet the minimum requirements from the manufacturer in accordance with:
        1) ASTM F2659 Preliminary Evaluation of Comparative Moisture Condition of Concrete, Gypsum Cement and Other Floor Slabs and Screeds Using a Non-destructive Electronic Moisture Meter, such as the Tramex X5 or similar. Electrical Impedance Testing is recommended as an effective method for determining the ideal start time for the more
        2) ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
        3) ASTM F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
        4) Additional tests:
            a) ASTM D4263
            b) ASTM F3191

5) Testing the substrate with an electrical impedance meter (EIM), refer to ASTM F2659, is recommended due to possible issues related to topical moisture from dew point conditions. Refer to the instructions of the EIM used for it pass / fail thresholds.

c. Additional testing:
1) New Slabs on all grade levels: Perform ASTM F2170 Relative Humidity testing no more than a week prior to installation to determine the levels present and when to proceed with the installation.
2) Existing Slabs on all grade levels: In addition to ASTM F2170 testing, existing slabs that have previously had floor covering installed, must be tested to ASTM F1869 Calcium Chloride test kits to determine the MVER of the concrete.

d. For moisture readings exceeding the RH and/or MVER limitations, a dehumidification system can be utilized until moisture readings when reevaluated are within acceptable levels.

4. pH Testing
a. ASTM F3441 Standard Guide for Measurement of pH Below Resilient Flooring
b. Test results must not exceed the limits of the flooring adhesive. If the test results are not within the acceptable range, then installation must not proceed until the problem has been corrected.

C. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

1. Ensure substrate meets the requirements of ASTM F710 for concrete substrates and ASTM F1482 for wood substrates.
2. Substrates must be free of visible water or moisture, dust, sealers, paint, sweeping compounds, curing compounds, residual adhesives and adhesive removers, concrete hardeners or densifiers, solvents, wax, oil, grease, asphalt, visible alkaline salts or excessive efflorescence, mold, mildew and any other extraneous coating, film, material or foreign matter.
3. Acclimate all products to be used during the installation and the installation environment prior to installation according to the manufacturers written instructions.
4. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
5. Floor Flatness:
a. It is recommended that all substrates have a floor flatness of FF32 and/or flatness tolerance of 1/8” in 6’ or 3/16” in 10’.
6. Roughness Profile of Substrate:
a. Substrate surface to meet Roughness Profile / Concrete Surface Profile (CSP)
b. Refer to flooring manufacture requirements to ensure adhesion to substrate, including:
1) Mechanically prepare surface, grind / acid etch
2) Provide recommended bonding agent / primer to maximize chemical adhesion.
c. Where applicable, coordinate with top applied Moisture Vapor Barrier products.

D. Cementitious Underlayment:

1. Refer to Division 03 Section - Hydraulic Cement Underlayment for additional information.
2. Hydraulic Cement Self Leveling product:
a. Provide self-leveling, hydraulic cement underlayment under all areas to receive resilient floor finishes, both resilient tile and sheet flooring.
3. Trowelable Leveling and Patching Compounds:
a. Provide to fill any remaining cracks, holes, and depressions in substrates.

b. Where flooring meets adjacent flooring, grind sub-floor and flash patch to have finished top of flooring products meet flush.
c. Where floor threshold is noted to be installed, flash patch sub-floor to ensure threshold meets ANSI/ADA floor transition profile requirements.

E. Floor covering shall not be installed over expansion joints.

F. Do not install resilient products until they are same temperature as the space where they are to be installed.
1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

G. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing flooring.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
1. Lay tiles square with room axis, unless indicated otherwise in drawings.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern), unless indicated otherwise in drawings.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

G. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

H. Refer to manufacturer’s additional installation requirements, including:
1. Install with adhesive specified for the site conditions and follow adhesive label for proper use.
2. Tiles shall be “quarter turned” and lightly butted together as referenced in the Tarket Installation Instructions.
3. Roll the flooring in both directions using a 100 pound three-section roller.

3.4 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Perform the following operations immediately after completing floor tile installation:
   1. Remove adhesive and other blemishes from surfaces.
   2. Sweep and vacuum surfaces thoroughly.
   3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
   1. No traffic for 24 hours after installation.
   2. No heavy traffic, rolling loads, or furniture placement for 72 hours after installation.
   3. Wait 72 hours after installation before performing initial cleaning.

D. Refer to floor finish manufacture’s requirements prior applying wax to floor to confirm finish requires floor polish.

E. Quartz Tile - Finishing (no wax finish required):
   1. Remove soil, adhesive, and blemishes from floor tile surfaces.
   2. Seal product per manufacture’s recommendations
   3. Refer to flooring manufacturer’s product information for achieving a “higher gloss look”.
      a. Coordinate with Architect and Owner in field.

F. Cover and protect flooring tile until Substantial Completion.

G. A regular maintenance program must be started after the initial cleaning.

END OF SECTION 09 65 19

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Modular Carpet Tile
2. Walk-Off Carpet Tile

B. Related Requirements:

1. Section 035416 Hydraulic Cement Underlayment
2. Section 096513 Resilient Base and Accessories, for resilient wall base and accessories installed with carpet tile.
3. Section 096519 Resilient Tile Flooring

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
   a. Review delivery, storage, and handling procedures.
   b. Review ambient conditions and ventilation procedures.
   c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.

3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd..

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockups at locations and in sizes shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 FIELD CONDITIONS

A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Refer to “Interior Finish” Legend / Schedule on drawings for manufacturers, products, styles, and colors.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds:
   1. Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives:
   1. Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
   2. Adhesives shall have a VOC content of 50 g/L or less.

C. Transition Strips
   1. Carpet to Ceramic Tile:
      a. Refer to Div 09 “Tiling” specification
      b. Schluter Systems – Reno U – Stainless Steel Tile Edge Protection / Transition
   2. Carpet to Resilient Tile / Sheet:
      a. Refer to Div 09 “Resilient Base and Accessories” specification.
      b. Roppe – Rubber Joiner
   3. Refer to drawings for additional conditions and information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

   1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
d. Refer to additional requirements required by floor finish manufacture.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Concrete Substrates:
1. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Plywood Substrates:
1. Inspect and Secure: Check the plywood for loose panels, protruding screws, or nails. Drive any fastener heads completely flush or slightly below the surface, and screw down any squeaky or loose areas to eliminate flexing.
2. Clean the Surface: Sweep and vacuum the entire floor to remove all dust, dirt, wood shavings, and grease. A dirty floor prevents pressure-sensitive or peel-and-stick adhesives from bonding correctly.
3. Patch Imperfections: Use a cement-based floor patch or smoothing compound (Ardex Feather Finish) to fill screw holes, gouges, or low spots. Sand down any high spots or dried patching compound so the entire deck is flat and seamless.
4. Check Moisture Content: Confirm the plywood is completely dry. Excess moisture trapped under a wood subfloor can cause mold, mildew, or adhesive failure.
5. Apply Primer: Roll on a compatible floor primer, recommended by the manufacturer of your specific carpet tile adhesive, to seal the porous wood and improve bond strength.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

B. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders, unless noted otherwise.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

SECTION 09 91 00 - **PAINTING**

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and field painting of the following:
   1. Exposed exterior items and surfaces.
   2. Exposed interior items and surfaces.
   3. Repainting and surface preparation at areas of remodeling.
   4. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

C. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components.
      a. Architectural woodwork and casework, unless otherwise indicated**.**
      b. Acoustical wall panels.
      c. Toilet compartments.
      d. Metal lockers.
      e. Elevator entrance doors and frames.
      f. Elevator equipment.
      g. Finished mechanical and electrical equipment, unless otherwise indicated.
      h. Light fixtures.
      i. Distribution cabinets, except when in corridors or other normally occupied rooms.
   2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
      a. Foundation spaces.
      b. Furred areas.
      c. Ceiling plenums.
      d. Utility tunnels.
      e. Pipe spaces.
      f. Duct shafts.
      g. Elevator shafts.
   3. Finished metal surfaces include the following:
      a. Anodized aluminum.
      b. Fluoropolymer, powder coated or epoxy finished metal.
      c. Stainless steel, except exposed metal flashing indicated for field-painted finish.
      d. Chromium plate.
      e. Copper.
      f. Bronze and brass.
   4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.
b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

E. Related Sections include the following:
1. Division 05 Section "Structural Steel Framing": Shop priming structural steel.
2. Division 05 Section "Metal Fabrications": Shop priming ferrous metal; and factory finish for interior sheet metal closures.
3. Division 05 Section "Pipe and Tube Railings": Shop priming metal railings.
4. Division 06 Section “Sheathing” for wood subflooring to receive painted finish.
5. Division 07 Section "Sheet Metal Flashing and Trim": Stainless steel step flashing for field-applied painted finish.
6. Division 08 Section "Hollow Metal Doors and Frames": Shop priming steel doors and frames.
7. Division 09 Section "Gypsum Board": Surface preparation for gypsum board.
8. Division 09 Section "Resilient Flooring": Substrates for application of game line markings.
9. Division 32 Section "Flexible Asphalt Pavement": Traffic-marking paint

1.2 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
1. Flat: Lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell: Low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
3. Satin: Low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
4. Semigloss: Medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
5. Full Gloss: High-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.3 SUBMITTALS

A. Product Data: For each paint system specified. Include block fillers and primers.
1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.

3. Submit Samples on the following substrates for Architect's review of color and texture only:
   a. Concrete Unit Masonry: 4-by-8-inch Samples of masonry, with mortar joint in the center, for each finish and color.
   b. Finished Wood: 12-inch-square Samples for each species on actual material.
   c. Metal: 4-inch-square Samples of flat metal and 8-inch-long Samples of solid metal for each color and finish.

C. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type and color of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
   1. Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
      a. Wall Surfaces: Provide samples on at least 100 sq. ft. of wall surface.
      b. Small Areas and Items: The Architect will designate an item or area as required.
   2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.
      a. After finishes are accepted, the Architect will use the room or surface to evaluate coating systems of a similar nature.
   3. Final approval of colors will be from job-applied samples.

1.5 PRODUCT HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
   1. Product name or title of material.
   2. Product description (generic classification or binder type).
   3. Manufacturer's stock number and date of manufacture.
   4. Contents by volume, for pigment and vehicle constituents.
   5. Thinning instructions.
   6. Application instructions.
   7. Color name and number.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.6 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

1.7 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to area designated by Owner.
   1. Quantity: Furnish the Owner with unopened containers of 2 gallon of each material and color applied.
      a. Provide not less than 1 gallon for each part of multi-part formulations such as epoxy coatings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.

B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
   1. The Sherwin-Williams Company (SW).
   2. PPG Architectural Finishes, Inc. (PPG).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Provide systems indicated. Where substrates are required to be finished, but no system is specified for that particular substrate, employ finish system most closely related to that scope of work but modified with appropriate primers. In the case of components on walls, use system for adjacent wall or trim as determined by Architect. In the case of components on or suspended from ceilings or decks, use semigloss paint system.

C. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

D. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

E. Colors: Match colors indicated by reference to manufacturer's color designations.
   1. Provide contrasting colors for different elements exposed at ceiling level as selected by Architect, including steel trusses, roof deck, and ductwork.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
   1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
   2. Mask surfaces and construction adjacent to paint application areas to prevent paint from
   3. Preparing Previously Painted Surfaces: Remove existing paint from surfaces indicated using scrapers or chemical paint stripper as follows:
      a. Strip loose, chipped, alligatored or otherwise deteriorated paint using methods that will not damage existing surfaces.
      b. Remove paint to sound substrate. Sound, well-adhered paint may remain on surface.
      c. Rub steel surfaces to remove rust bloom, and solvent clean prior to priming.
      d. Allow surfaces to dry and sand smooth.
      e. Clean surfaces so they are free of dust and dirt.
      f. Fill cracks, gouges and nail holes with suitable filler prior to application of first coat.
      g. Complete surface preparation to produce a smooth, uniform substrate suitable for application of primer and finish coats specified.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
   1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove and reprime.
   2. Cementitious Materials: Prepare concrete and masonry surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
      a. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
      b. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
   3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
      a. When transparent finish is required, backprime with spar varnish.
   4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
      a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
      b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
      c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
   5. Architectural Exposed Structural Steel (AESS): Fill pits and mill marks with automotive body filler. Sand smooth so no evidence of filling is visible after paint is applied.
   6. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
   7. Stainless Steel: Mechanically abrade metal surface to create surface profile suitable for adhesion of paint, using No. 80 grit sandpaper and power sander.
      a. Wipe abrade surface with fast-drying thinner such as denatured alcohol or lacquer thinner.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
   1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
   2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
   3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
   1. Paint colors, surface treatments, and finishes are indicated in the schedules.
   2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
   3. Provide finish coats that are compatible with primers used.
   4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
   5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
   6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
   7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
   8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
   9. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
   2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
   1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
   2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
   3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as

recommended by the manufacturer. Use application rate to achieve finished dry film thickness (DFT) as indicated for each coat.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:
1. Piping, pipe hangers, and supports.
2. Heat exchangers.
3. Tanks.
4. Ductwork.
5. Insulation.
6. Supports.
7. Motors and mechanical equipment.
8. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:
1. Conduit and fittings.
2. Switchgear.
3. Panelboards.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
1. Provide a smooth, uniform finish, appearance, and coverage. Spotting, laps, roller marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
2. Spray application will not be permitted unless combined with back rolling or squeegeeing. Do not thin filler. Apply sufficient material to allow back rolling or squeegeeing to fill surface.
3. Where two filler coats are scheduled, allow first coat to fully dry before application of second. Back roll or squeegee both coats.
4. Do not use squeegee for scored unit masonry; backroll in manner that prevents buildup of block filler in score joints.
5. Extend block filler coats the full extent of exposed surfaces. Protect adjacent surfaces.

I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 EXTERIOR PAINT SCHEDULE

A. General: Provide the finish systems scheduled for each material type indicated, applied at spreading rate recommended by manufacturer to achieve the total dry film thickness (DFT) listed.
   1. Provide 2 finish coats over the listed base coats (primer, filler, bond coat) except as otherwise indicated.

B. Exterior Concrete, Stucco, and Masonry (Other than Concrete Masonry Units):
   1. Elastomeric Finish:
      a. Primer: Alkali-resistant, exterior, acrylic-latex primer or surface conditioner.
         1) SW: Loxon Concrete & Masonry Primer, LX02 Series.
         2) PPG: Perma-Crete Interior/Exterior Alkali Resistant Primer 4-603XI.
      b. First and Second Coats: High build elastomeric finish.
         1) SW: Conflex XL Elastomeric High Build Coating, A5-400 Series; 7.5 mils DFT.
         2) PPG: Perma-Crete Pitt-Flex Elastomeric Coating.

C. Concrete Masonry Units:
   1. Satin Acrylic
      a. Primer:
         1) SW Prep Rite Interior/ Exterior Block Filler
      b. First and Second Coats:
         1) SW A-100 Satin Finish

D. Exterior Ferrous Metal:
   1. Gloss, Urethane Finish:
      a. Primer: Provide primer over bare metal and over shop-applied primers.
         1) SW: Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series.
         2) PPG: Pitt-Tech Plus 4020 PF
      b. First and Second Coats: Gloss urethane finish.
         1) SW: WB Alkyd Urethane Enamel, B53 Semi-Gloss.
         2) PPG: Pitt Tech Plus Waterborne Acrylic, Semi-Gloss 4216HP

3.5 INTERIOR PAINT SCHEDULE

A. General: Provide the finish systems scheduled for each material type indicated, applied at spreading rate recommended by manufacturer to achieve the total dry film thickness (DFT) listed.
   1. Provide 2 finish coats over the listed base coats (primer, filler, bond coat) except as otherwise indicated.

B. Interior Concrete Walls: Allow to cure minimum 30 days.
   1. Semigloss, Water Based Epoxy Finish:
      a. Primer:
         1) SW: Loxon Concrete and Masonry Primer, 2.0-3.0 mils DFT.
         2) PPG: Perma Crete Primer 4603XI
      b. First and Second Coats: Semigloss acrylic epoxy finish.
         1) SW: ProIndustrial PreCatalyzed WaterBased Epoxy K-46, 2.5-3.0 mils DFT.

2) PPG: Pitt-Glaze WB1 Interior Pre-Catalyzed Water-Borne Acrylic Epoxy

C. Interior Concrete Masonry Units (CMU):
Semi-Gloss, Water Based, Two Part Epoxy Finish: provide the following in all food service rooms including store rooms and supplemental spaces.
a. Block Filler: Three Coats acrylic latex high build block filler.
1) SW: PrepRite Block Filler, B25W25.
2) PPG: Speedhide Latex Block Filler 6-15XI.
b. First and Second Coats: Semigloss acrylic epoxy finish.
1) SW: ProIndustrial Pre-Catalyzed Water Based Epoxy, 2.5-3.0 mils DFT.
2) PPG: Pitt-Glaze WB Interior Pre-Catalyzed Water-borne Acrylic Epoxy, 2.0-5.0 mils DFT.
2. Semigloss, Water Based, Two Part Epoxy Finish: provide the following in corridors, janitor closets, mechanical rooms, toilet rooms, locker rooms and receiving rooms.
a. Block Filler: Two Coats acrylic latex high build block filler.
1) SW: PrepRite Block Filler, B25W25.
2) PPG: Speedhide Latex Block Filler 6-15XI.
b. First and Second Coats: Semigloss acrylic epoxy finish.
1) SW: ProIndustrial Pre-Catalyzed Water Based Epoxy, 2.5-3.0 mils DFT.
2) PPG: Pitt-Glaze WB Interior Pre-Catalyzed Water-borne Acrylic Epoxy, 2.0-5.0 mils DFT.
3. Low Luster, Acrylic-Enamel Finish: provide the in locations not specified above for epoxy.
a. Block Filler: Two Coats acrylic latex high build block filler.
1) SW: Prep Rite Block Filler B25W25
2) PPG: Speedhide Latex Block Filler 6-15XI.
b. First and Second Finish Coats: Low-luster acrylic-latex interior enamel.
1) SW: ProMar 200 Zero VOC , Eg-Shel, 1.6 mills DFT.
2) PPG: Speedhide Zero Interior Latex Eggshell 6-4310XI.

D. Gypsum Board Ceilings and Soffits:
1. Flat Acrylic, Low-VOC Finish:
a. Primer:
1) SW: ProMar Ceiling Paint flat, 1.1 mils DFT.
2) PPG: Speedhide Zero Interior Latex Primer 6-4900XI, 1.4 mils DFT.
b. First and Second Coats:
1) SW:ProMar Ceiling Paint flat ; 4.6 mils DFT.
2) PPG: Speedhide Zero Interior Latex Flat 6-5110, 2.0-4.0 mils DFT.

E. Gypsum Board Walls.
1. Low-Luster, Acrylic-Enamel, Low-VOC Finish:
a. Primer:
1) SW: ProMar 200 Zero Primer, 1.1 mils DFT.
2) PPG: Speedhide Zero Interio Latex Primer 6-4900, 1.4 mils DFT.
2. First and Second Coats:
1) SW: ProMar 200 Zero VOC, Eggshell, 1.5 mils DFT.
2) PPG: Speedhide Zero Interior Latex Eggshell, 6-5310, 1.0-3.0 mils DFT.

F. Gypsum Board, Moisture Conditions:
1. Water-Reducible Epoxy Coating System: Provide the following for gypsum board surfaces located in toilet rooms.
a. Primer: Latex-based, interior primer.
1) SW: Extreme Block Waterbased Stain Blocking Primer; 1.6 mils DFT.

2) PPG: Seal Grip Gripper Water Based Stain Blocking Primer 17-921XI, 1.4 mils DFT.

b. First and Second Coats: Semi-gloss epoxy finish.
1) SW: ProIndustrial Pre-Catalyzed Water-Based Epoxy; B70-200 Series; 3.0 DFT
2) PPG: Pitt-Glazed WB1 Interior Pre-Catalyzed Water-borne Acrylic Epoxy, 2.0-5.0 mils DFT.

G. Ferrous and Non-Ferrous Metal Components at Ceiling Level: Apply the following coating system to exposed roof trusses and other structural steel in exposed high areas.
1. Dry Fall, Acrylic Flat Finish: Where colors indicated exceed manufacturer's recommended pigment proportions, use semi-gloss paint system specified for interior ferrous metal.
a. Primer: Metal primer.
1) SW: ProIndustrial Pro-cryl, Universal Primer, B50, 2.0-5.0 mils DFT.
2) PPG: Pitt Tech Plus EP DTM Acrylic Primer 90-1912, 2.2-3.5 mils DFT.
2. First and Second Coats: flat dry fall finish.
1) SW: Low VOC Waterborne Acrylic Dryfall Flat, B42, 3.5-5.0 mils DFT.
2) PPG: Speedhide Super Tech Flat Acrylic Dry Fall, 1.5-2.0 mils DFT.

H. Interior Ferrous and Non-Ferrous Metal: Apply the following coating system to interior ferrous metal not scheduled to receive another coating.
1. Semigloss, Acrylic-Enamel, Low-VOC Finish:
a. Primer:
1) SW: ProIndustrial ProCryl Universal Primer.
2) PPG: Pitt Tech Plus Primer/ Finish 4020 PF, 2.2-3.5 mils DFT.
b. First and Second Coats:
1) SW: ProIndustrial WB Acrylic Urethane Enamel, Semigloss, B53, 1.4 mils DFT.
2) PPG: Pitt-Tech Plus EP Interior/Exterior Acrylic Gloss DTM Industrial Enamel, Semi-Gloss, 2.0-4.0 mils DFT.

I. Painted Interior Woodwork:
1. Semigloss, Latex-Enamel Finish:
a. Primer: Latex-based, interior enamel undercoater.
1) SW: ProMar 200 Zero VOC Primer; 1.6 mils DFT.
2) PPG: Seal Grip Gripper Acrylic Universal Primer 17-921XI, 1.4 mils DFT.
b. First and Second Coats: Semigloss, Latex, interior enamel.
1) SW: Solo 100% Acrylic Latex, Semi-gloss, 1.4 mils DFT.
2) PPG: Speedhide Zero Interior Latex Semi-Gloss, 6-5510, 1.4 mils DFT

3.6 CLEANING AND PROTECTION

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

B. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

C. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
   1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION 09 91 00

SECTION 10 14 00 – SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aluminum Channel Letter (Fabricated Channel Character)

2. Aluminum Cabinet Sign w/ Digital Graphic on Polycarbonate Face Panel

3. Flat Aluminum Panel Sign with Digital Graphic

B. Related Sections include the following:
1. Division 01 Section "Project Identification & Signs" for temporary Project identification signs and for temporary information and directional signs.
2. Division 03 Section “Cast In Place Concrete” for exterior sign footings.
3. Division 26 Section "Lighting" for illuminated Exit signs.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details for signs.
1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, and layout for each sign.

C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
1. Aluminum.
2. Acrylic sheet.

D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
2. Aluminum: For each form, finish, and color, on 6-inch- long sections of extrusions and squares of sheet at least 4 by 4 inches.
3. Acrylic Sheet: 8 by 10 inches for each color required.
4. Stenciled Lettering: Sample of lettering applied to gypsum wall board.
5. Accessories: Manufacturer's full-size unit.

E. Sign Schedule: Use same designations indicated on Drawings.

F. Qualification Data: For Installer and fabricator.

G. Maintenance Data: For signs to include in maintenance manuals.

H. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

1.5 PROJECT CONDITIONS

A. and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Deterioration of metal and polymer finishes beyond normal weathering.
      b. Deterioration of embedded graphic image colors and sign lamination.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of sign type(s) according to structural performance requirements.

B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads.

C. Thermal Movements: For exterior signage, allow for thermal movements from ambient and surface temperature changes.

D. by a qualified testing agency, and marked for intended location and application.

2.2 MANUFACTURERS

A. Basis of Design Manuf:
1. Slicks Graphics, Inc. Signs
2. Address: 1307 S. Pennsylvania Ave., Morrisville, PA 19067
3. Web address: www.slicksgraphics.com
4. Telephone: 215-736-8000
5. Contact: Jessica Bock

B. Available Manufacturers - Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. AGS (Adelphia Graphic Systems)
2. FastSigns
3. Gemini Incorporated.
4. InPro Corporation.
5. Mohawk Sign Systems.
6. Signature Signs, Inc.
7. Signarama, Inc.

2.3 FABRICATED SIGNAGE

A. Aluminum Channel Letters (Fabricated Channel Characters)
1. Description:
   a. Metal face and side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles;
   b. Internally braced for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
2. Character Material:
   a. Sheet or plate aluminum.
   b. Exterior Grade / Weather Resistant
3. Material Thickness: Manufacturer's standard thickness for size of character
4. Character Height: As indicated on Drawings
5. Character Depth: As indicated on Drawings
   a. If not indicated on drawings, provide 2 inch depth.
6. Finishes:
   a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range
   b. Where indicated in drawings, provide Color #1 on sign ‘face’ and Color #2 on sign ‘sides’.
7. Mounting:
   a. Concealed Aluminum Stud
   b. Hold characters at manufacturer's recommended distance from wall surface.
8. Typeface: (Sans Serif font similar to Arial, to be determined during Shop Drawing phase.)
9. Weeps: Provide weep holes to drain water at lowest part of exterior characters.

B. Aluminum Cabinet Sign w/ Digital Graphic on Polycarbonate Face Panel
   1. Aluminum Cabinet
      a. Metal back and side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles;
      b. Internally braced for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
      c. At large scale signs, provide heavy-duty retainer system to securely capture the face panel while also serving as an additional structural bracing system.
      d. Aluminum Finishes: Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range
   2. Face Panel:
      a. White polycarbonate with the custom graphic digitally printed directly onto the surface. Highly durable, impact-resistant plastic sheets engineered specifically for outdoor commercial signage
      b. UV Stable / Weather Resistant
      c. At large scale signs, provide concealed seams where exceeds panel material dimensions.
   3. Digital Graphic
      a. Direct-applied, highly durable finish to face panel.
      b. UV Stable / Weather Resistant
      c. Full color, full-bleed, edge to edge graphic.
      d. Digital File: Vector image file of owner’s logo to be provided by Owner / Architect.
   4. Exterior Grade:
      a. Weather Resistant
      b. UV Resistant
      c. Weep holes: Provide to drain water at lowest part of exterior characters.
   5. Size & Location: As indicated on Drawings.
   6. Mounting:
      a. Provide concealed structural supports attached to structure of building per manufacture’s recommendations.
      b. Attach to wall substrate with concealed supports and fasteners per manufacture’s recommendations.

C. Flat Aluminum Panel Sign with Digital Graphic
   1. Panel Material: Heavy-duty .080 gauge, 5052-38 alloy aluminum (High Impact)
   2. Panel Corners: 1 inch Radius to prevent sharp edges, catching or peeling at the corners.
   3. Digital Graphic
      a. Direct-applied, highly durable finish to face panel with high-performance protective overlaminate
      b. UV Stable / Weather Resistant
      c. Full color, full-bleed, edge to edge graphic.
      d. Digital File: Vector image file to be provided by Architect.
   4. Size & Location: As indicated on Drawings.
   5. Mounting:
      a. Attach to wall substrate with concealed supports and fasteners per manufacture’s recommendations.

D. General Materials for Dimensional Characters:

1. Aluminum Sheet and Plate: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
2. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.
3. White Polycarbonate Sign Panel
    a. Basis of Design Manuf.:
        1) Lexan
        2) Tuffak
    b. UV & Weather Resistance: Sign-grade sheets feature advanced UV-stabilized coatings prevent the material from yellowing, hazing, or losing impact strength under long-term solar exposure.
    c. Panel Thickness: 1/4 inch, minimum
    d. Panel Width: Up to 72 inch

2.4 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
2. For exterior exposure, furnish stainless steel devices unless otherwise indicated.

B. Exposed Metal-Fastener Components, General:
1. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

C. Sign Mounting Fasteners:
1. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
2. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

D. Adhesive: As recommended by sign manufacturer.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 STENCIL-PAINTED LETTERING

A. Provide lettering in size indicated and suitable for field application of paint to substrates for lettering. Stencil shall be suitable to spray or roller application.

B. Provide contrasting color paint to make letters visible in low light conditions. Provide paint suitable for substrates.

2.6 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set

into concrete or masonry work.

2.7 FABRICATION

A. General: Provide manufacturer's standard signs of configurations indicated.
1. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
2. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
3. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.8 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

A. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

B. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) mechanical finish, complying with AAMA 611

2.10 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

B. Verify that items, including anchor inserts, are sized and located to accommodate signs.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
   1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Flush Mounting: Mount characters with backs in contact with wall surface.
   3. Projected Mounting:
      a. Mount characters at projection distance from wall surface indicated.
      b. Where surfaces are uneven, such as at segmented retaining wall, provide variable length studs to set letters off wall the minimum distance specified and so letters are in a single plane parallel to the average face of the wall.

B. Above Ceiling Warning Signs:
   1. Stencil Painted Lettering
      a. Provide on face of fire rated walls, above ceilings, typical.
   2. Lettering shall be visible in contrast with background color.
      a. Where necessary to enhance visibility, provide a background color 4 inches wider and taller than required lettering. Allow background color to set, apply stencil as indicated.
   3. Text: “FIRE AND/OR SMOKE BARRIER, PROTECT ALL OPENINGS”
      a. Size: 3 inches high, minimum

C. Site Signs: All other standards including but not limited to post height, post embedment, and location off paved surfaces and curbs, shall comply with PennDOT standards.
   1. Concrete foundation shall be as specified in Section 03 30 00 “Cast In Place Concrete”

3.3 CLEANING AND PROTECTION

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

3.4 SIGNAGE INSTALLATION SCHEDULE

A. Signage - Refer to drawings for signage types, size & locations.

B. Above Ceiling Warning Signs with Stencil Painted Lettering
   1. Locations:
      a. Provide above ceiling and accessible concealed areas at all ‘rated’ walls.
         1) Refer to Code plan for locations of fire rated walls.
      b. Provide a sign every 30 feet on center, start 15 feet maximum from end of wall.

END OF SECTION 10 14 00

SECTION 10 14 16 PLAQUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Cast Metal Dedication Plaque

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For plaques.

1. Include fabrication and installation details and attachments to other work.
2. Show plaque mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each plaque at least half size.

C. Samples for Initial Selection: For each type of plaque, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of plaque showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Plaques: Full-size Sample.
2. Exposed Accessories: Full-size Sample of each accessory type.
3. Full-size Samples, if approved, will be returned to Contractor for use in the Project.

E. Product Schedule: For plaques. Use same designations indicated on Drawings or specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For plaques to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Deterioration of finishes beyond normal weathering.
   b. Deterioration of embedded graphic image.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

2.2 CAST METAL DEDICATION PLAQUE

A. Description: Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

B. Basis-of-Design Product:
1. Subject to compliance with requirements, provide products by:
   a. Gemini Incorporated
   b. Or a comparable product by one of the following:
      1) Sign-a-rama
      2) A.R.K. Ramos.
      3) ACE Sign Systems, Inc.
      4) Metal Arts.

C. Plaque information:
1. Material: Cast bronze, unless noted otherwise in drawings.
2. Thickness: 0.5 inch.
3. Size & Location: Refer to drawings.
4. Face Finish:
   a. Satin finish on raised letters, elements and borders
   b. Protect with clear matte coat, per manuf. recommendations.

5. Background Color: To be selected from manuf. full range.
6. Background Texture: To be selected from manuf. full range.
7. Integrally Cast Border Style: Square double line, polished.
8. Mounting: Concealed, blind stud mount, anchored to wall.
9. Text and Typeface: Typeface as selected by Architect from manufacturer's full range and variable content as scheduled.
10. Graphics:
    a. Custom layout of graphics & text to be determined by Owner & Architect during submittal phase.
    b. Include sculptural relief of photo engraved image / logo.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
   2. Plaque Mounting Fasteners:
      a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.4 FABRICATION

A. General: Provide manufacturer's standard plaques according to requirements indicated.

   1. Preassemble plaques in the shop to greatest extent possible. Disassemble plaques only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
   2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
   3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
   4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
   5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
   6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted plaques to suit plaque construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish to match plaque-background color unless otherwise indicated.

2.5 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.6 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.

1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.

a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place plaque in position and push until flush to surface, embedding studs in holes. Temporarily support plaque in position until adhesive fully sets.
b. Thin or Hollow Surfaces: Place plaque in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as plaques are installed.

C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 21 13 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-plastic (HDPE) toilet compartments configured as toilet enclosures and urinal screens.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.

C. Samples for Initial Selection: For each type of toilet compartment material indicated.

1. Include Samples of hardware and accessories involving material and color selection.

D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:

1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-square Samples of same thickness and material indicated for Work.
2. Each type of hardware and accessory.

E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.

1. Door Hinges: One hinge with associated fasteners.
2. Latch and Keeper: One latch and keeper with associated fasteners.
3. Door Bumper: One bumper with associated fasteners.
4. Door Pull: One door pull with associated fasteners.
5. Fasteners: Ten fasteners of each size and type.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments and urinal screens by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire hazard classification: Pass NFPA 286.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 TOILET COMPARTMENTS / TOILET PARTITIONS

A. Toilet Partitions – Privacy
1. Toilet-Enclosure Style: Floor mounted overhead braced.
2. Product:
a. ASI Global Partitions
1) Style: Solid Plastic Toilet Partitions (HDPE) - Privacy
a) Shiplap Door Edges
b) Height: 55 inch high panels
c) Color: To be selected from manufacturer’s full line.

d) Latch: Stainless steel ultimate privacy latch and occupancy indicator
2) Install per manufacturer's recommendations.

B. Urinal-Screen Style:
1. Wall connected with 3x3 square post Floor to Ceiling structure support at end of panel.
a. Provide wall, floor and ceiling bracing.
2. Panel size – Provide the following if not indicated otherwise in drawings:
a. Height: (Match adjacent toilet partitions)
b. Depth: 20 inches

C. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.
1. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
2. Doors & Panels to be shiplap (privacy) cut edge for no sight construction, match height of adjacent panel system.
3. Color and Pattern: As selected by Architect from manufacturer's full range.

D. Pilaster Shoes: Manufacturer's standard design; stainless steel.

E. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.

1. Hinges: Manufacturer's helix hinge, stainless steel, full height (continuous), self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
2. Latch Mechanism: Stainless-steel unit with 'occupancy indicator' slide bolt and button. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors. Mount with through-bolts.
5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip

galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221.

B. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

C. Stainless-Steel Castings: ASTM A 743.

2.5 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide, in-swinging doors for standard toilet compartments and 36-inch-wide, out-swinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

D. Urinal Screen Sizes: Provide panels with a minimum width of 20 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1/2 inch.
b. Panels and Walls: 1 inch.

2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 21 13

SECTION 10 22 13 - WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Heavy-duty wire mesh partitions.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include plans, elevations, sections, details, and attachments to other work.
2. Indicate clearances required for operation of doors and gates.

C. Samples for Verification: 12-by-12-inch panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.

D. Delegated-Design Submittal: For wire mesh partitions indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Welding certificates.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wire mesh partition hardware to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Door Locks: Furnish for each type indicated as recommended by door hardware supplier and as required by Township for attic stock.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped to provide protection during transit and Project-site storage. Use vented plastic.

B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.

1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

C. Deliver keys to Owner by registered mail or overnight package service.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Acorn Wire & Iron Works.
2. Central Wire and Iron.
3. Jesco Industries, Inc.
4. Miller Wire Works, Inc.
5. Standard Wire & Steel Works.
6. WireCrafters, LLC.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wire mesh units.

B. Structural Performance: Wire mesh units shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft. at any location on a panel.
2. Total load of 200 lbf applied uniformly over each panel.
3. Concentrated load and total load need not be assumed to act concurrently.

2.3 MATERIALS

A. Steel Wire: ASTM A510.

B. Steel Plates, Channels, Angles, and Bars: ASTM A36/A36M.

C. Steel Sheet: Cold-rolled steel sheet, ASTM A1008/A1008M, Commercial Steel (CS), Type B.

D. Steel Pipe: ASTM A53/A53M, Schedule 40, unless another weight is indicated or required by structural loads.

E. Steel Tubing: ASTM A500/A500M, cold-formed structural-steel tubing or ASTM A513, Type 5, mandrel-drawn mechanical tubing.

F. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with G60 zinc (galvanized) or A60 zinc-iron-alloy (galvannealed) coating designation.

G. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.

H. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components are zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.

I. Power-Driven Fasteners: ICC-ES AC70.

J. Shop Primers: Provide primers that comply with Section 099123 "Interior Painting."

2.4 HEAVY-DUTY WIRE MESH PARTITIONS

A. Mesh: 0.192-inch-diameter, intermediate-crimp steel wire woven into 2-inch diamond mesh.

B. Vertical and Horizontal Panel Framing: 1-1/2-by-3/4-by-1/8-inch cold-rolled steel channels; with holes for 3/8-inch-diameter bolts not more than 12 inches o.c.

C. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 1 by 1/2 by 1/8 inch, bolted or riveted toe to toe through mesh.

D. Top Capping Bars: 3-by-1-inch steel channels.

E. Posts for 90-Degree Corners: 1-1/2-by-1-1/2-by-1/8-inch steel angles or tubes or 2-by-2-by-0.075-inch cold-rolled steel angles or tubes, with holes for 3/8-inch-diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

F. Posts for Other-Than-90-Degree Corners: 2-inch-OD by 1/8-inch steel pipe or round tube, with holes for 3/8-inch-diameter bolts aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

G. Adjustable Corner Posts: Two 1-1/2-by-3/4-by-1/8-inch cold-rolled, steel channels or 2-by-2-by-0.075-inch steel tubes connected by steel hinges at 36 inches o.c. attached to posts; with 1/4-inch-diameter bolt holes aligning with bolt holes in vertical framing; with 1/4-inch steel base plates.

H. Line Posts: 3-inch-by-4.1-lb or 3-1/2-by-1-1/4-by-1/8-inch steel channels; with 1/4-inch steel base plates.

I. Three- and Four-Way Intersection Posts: 2-by-2-by-0.075-inch steel tubes, with holes for 3/8-inch-diameter bolts aligned for bolting to adjacent panels; with 1/4-inch steel base plates.

J. Floor Shoes: Metal, not less than 2 inches high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.

K. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch steel channels, banded with 1-1/2-by-1/8-inch flat steel bar cover plates on four sides, and with 1/8-inch-thick angle strike bar and cover on strike jamb.

1. Hinges: Full-surface type, 3-1/2-by-3-1/2-inch steel, three per door; bolted, riveted, or welded to door and jamb framing.
2. Cylinder Lock: Mortise type with cylinder specified in Section 087100 "Door Hardware"; operated by key outside and lever inside; mounted in lower section of door.
    a. Removable core and cylinder housing by door hardware supplier, balance of hardware by partition supplier.
3. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.

L. Accessories:

1. Adjustable Filler Panels: 0.060-inch-thick steel sheet, capable of filling openings from 2 to 12 inches.
2. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to 1 inch of adjustment.

M. Finish: Powder-coated finish unless otherwise indicated.

1. Color: As selected by Architect from manufacturer's full range of standard colors.

2.5 WIRE MESH CEILINGS

A. Mesh, Framing, and Stiffeners: Fabricated from same mesh and framing as wire mesh partition panels.

B. Perimeter Partition Supports: 1-1/2-by-1-1/2-by-1/8-inch steel angle, with holes for 1/4-inch-diameter bolts aligned for bolting to top of wire mesh partitions and to sides of wire mesh ceiling panels.

C. Wall Supports: 1-1/2-by-1-1/2-by-1/8-inch steel angle punched for attachment to wall and wire mesh ceiling panels.

D. Intermediate Supports: Steel I-beams or rectangular tubes, as recommended by manufacturer.

E. Intermediate Support Posts: 2-by-2-by-1/8-inch steel tubes.

F. Finishes: Match adjacent wire mesh partitions.

2.6 FABRICATION

A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.

1. Fabricate wire mesh items to be readily disassembled.
2. Welding: Weld corner joints of framing and finish sand.

B. Heavy-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.

1. Mesh: Securely clinch mesh to framing.
2. Framing: Fabricate framing with mortise and tenon corner construction.

    a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
    b. Fabricate three- and four-way intersections using intersection posts.
    c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.

3. Doors: Align bottom of door with bottom of adjacent panels.

    a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.

4. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

2.7 STEEL AND IRON FINISHES

A. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

B. Shop Priming: Apply shop primer to uncoated surfaces of wire mesh units unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

C. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on powder-coat finish, suitable for use indicated, with a minimum dry film thickness of 2 mils.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine floors for suitable conditions where wire mesh items will be installed.

C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRE MESH PARTITIONS ERECTION

A. Anchor wire mesh partitions to floor with 3/8-inch-diameter postinstalled expansion anchors at 12 inches o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.

1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.

B. Anchor wire mesh partitions to walls at 12 inches o.c. through back corner panel framing and as follows:

1. For concrete and solid masonry anchorage, use expansion anchors.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

C. Secure top capping bars to top framing channels with 1/4-inch-diameter "U" bolts spaced not more than 28 inches o.c.

D. Provide line posts at locations indicated or, if not indicated, as follows:

1. For partitions that are 7 to 9 feet high, spaced at 15 to 20 feet o.c.
2. For partitions that are 10 to 12 feet high, located between every other panel.
3. For partitions that are more than 12 feet high, located between each panel.

E. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.

F. Install doors complete with door hardware.

G. Bolt accessories to wire mesh partition framing.

3.3 ADJUSTING AND CLEANING

A. Adjust doors to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.

C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION

SECTION 10 26 00 – WALL AND DOOR PROTECTION

PART – 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Corner Guards
      a. Stainless Steel [CG-SS]

B. Related Requirements:
   1. Division 09 “Gypsum Board” for wall substrates.
   2. Division 09 “Interior Painting” for priming walls.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of wall and door protection showing locations and extent.
   1. Include plans, elevations, sections, and attachment details.

C. Samples: For each exposed product and for each color and texture specified, 12 inches long.

D. Maintenance data.

1.3 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities

2.2 CORNER GUARDS

A. Stainless Steel Corner Guards [CG-SS]
   a. Inpro – Stainless Steel Corner Guards, C08 #304 (Basis of Design)
   b. Mount: Adhesive
   c. Leg Sizes: 1 1/2 inch by 1 1/2 inch
   d. Angle:
      1) 90 degrees typical
   e. Height:
      1) 48 inches, typical unless note otherwise on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions in which the wall protection system will be installed.
   1. Complete all finishing operations, including painting, before beginning installation of sheet materials.

B. Wall surface shall be dry and free from dirt, grease and loose paint.

C. Wall Substrate Finish Level: 4 minimum or per manuf. requirements

3.2 INSTALLATION

A. General: Prior to installation, clean substrate to remove dust, debris and loose particles.

B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

   1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
   2. Plaster: Allow plaster to cure for at least 90 days. Neutralize areas of high alkalinity. Apply primer/sealer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   3. Metals: If not factory primed, clean and apply metal primer as recommended in writing by metal-primer manufacturer and wall-covering manufacturer.
   4. Gypsum Board: Apply primer/sealer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
   5. Painted Surfaces:

      a. Check for pigment bleeding. Apply primer/sealer to areas susceptible to pigment bleeding as recommended in writing by primer/sealer manufacturer.
      b. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.

C. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

D. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.

3.3 CLEANING

A. At completion of the installation, clean surfaces in accordance with the IPC clean-up and maintenance instructions.

END OF SECTION 10 26 00

SECTION 10 28 00 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Toilet accessories as scheduled.
   2. Janitor closet accessories.

B. Related Sections include the following:
   1. Division 10 Section "Toilet Compartments": Compartments and screens.
   2. Division 22 Section "Plumbing Fixtures".

1.2 SUBMITTALS

A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.

B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.

C. Maintenance Data: For accessories to include in maintenance manuals. Provide lists of replacement parts and service recommendations.

1.3 QUALITY ASSURANCE

A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.

B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
   1. Products of other manufacturers with equal characteristics, as judged solely by Architect, may be considered. See Division 01 Section "Product Requirements" regarding substitution procedures.
   2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

C. Regulatory Requirements: Comply with provisions Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)" for manufacture and installation of toilet accessories.

D. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
   1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

1.4 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.5 WARRANTY

A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
1. Minimum Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products:
1. Provide models by Bobrick Washroom Equipment, Inc. as indicated for each product in the Schedule at the end of Part 3.

B. Comparable Manufacturers of Toilet Accessories: Subject to compliance with requirements, provide the named products or comparable products by one of the following:
1. American Specialties, Inc.
2. Bradley Corporation.
3. McKinney/Parker Washroom Accessories Corp.

2.2 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.

B. Sheet Steel: ASTM A 366, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.

C. Galvanized Steel Sheet: ASTM A 653, G60.

D. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.

E. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

F. Vitreous Enamel Finish: Manufacturer's standard fired-on vitreous finish over cast iron.

G. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

H. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION

A. General: One, maximum 1-1/2-inch- diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.

C. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless-steel hinge. Provide anchorage that is fully concealed when unit is closed.

D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with non-absorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
1. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.

C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET ACCESSORY SCHEDULE

A. General: Where designations below are indicated on Drawings, provide the toilet accessory item complying with specified requirements.

Drawing Designation Tag	Description:	Basis of Design Product:
D	Toilet Paper Dispenser (2 Vertical)	Scott Pro 09606 Double Roll Dispenser (Compatible w/ 47305 refill), Stainless Steel
E1, E2	Grab Bar (2) Horizontal / (1) Vertical	Bobrick B-6806.99 x 18 / B-6806.99 x 42 / B-6806.99 x 42
E3	Shower Grab Bar (2) Horizontal / (1) Vertical	Bobrick B-6806.00 x 18 / B-6806.99 x 36 / B-6806.99 x 48
F	Feminine Product Dispenser	Bobrick B-47069 25
F1	Sanitary Napkin Disposal	Bobrick B-270
G	Hand Dryer	By EC
H	Paper Towel Dispenser (Surface Mnt.)	Tork Matic Paper Hand Towel Roll Dispenser H1 5510282, Black
H1	Paper Towel Dispenser & Waste Recpt.	Not Used
K	Mirror	Bobrick B2908 1836 (18”x36”) - Tempered
L	Soap Dispenser	GOJO FMX-20 Dispenser SKU 5271-06
M	Mop Holder – Wall Mount	Bobrick B-223 x 24
N	Coat Hook	Bobrick B-76717
O	Waste Receptacle	By Owner
U	Utility Shelf with Mop Holder	Bobrick B-239 x 34
Y	Baby Changing Station	Bobrick KB310-SSWM
Z, AB	Shower Curtain Rod, Curtain, Hooks	Rod: Bobrick B-6107 x 36 Curtain: Bobrick 204-2 Hooks: Bobrick 204-1

END OF SECTION 10 28 00

SECTION 10 44 00 - FIRE-PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Portable fire extinguishers.
2. Fire protection cabinets.
3. Mounting brackets for fire extinguishers.
4. AED Recessed Cabinet.
5. Fireman's Key Box.

1.3 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire-protection cabinets.
1. Fireman’s key box.

PART 2 - PRODUCTS

2.1 PORTABLE FIRE EXTINGUISHERS

A. Manufacturers of Fire Extinguishers, Cabinets and Accessories**:** Subject to compliance with requirements, provide products by one of the following:
1. J.L. Industries, Inc.
2. Larsen's Manufacturing Company.
3. Potter-Roemer; Div. of Smith Industries, Inc.
4. Watrous; Div. of American Specialties, Inc.

B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
1. Valves: Nickel-plated polished brass body.
2. Handles and Levers: Stainless steel.
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 4-A:80-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
1. Application: Typical Locations.

2.2 FIRE-PROTECTION CABINETS

A. Basis-of-Design Product: Larsen's Manufacturing Company; Architectural with Larsens Lock or a comparable product by one of the following:
1. JL Industries, Inc.
2. Potter Roemer; Div. of Smith Industries, Inc.

3. Watrous; Div. of American Specialties, Inc.

B. Cabinet Type: Suitable for fire extinguisher.

C. Cabinet Construction: Nonrated.

D. Cabinet Material: Stainless-steel sheet.
   1. Shelf: Same metal and finish as cabinet.

E. Recessed Cabinet: Cabinet box recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
   1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.

F. Cabinet Trim Material: Stainless-steel sheet.

G. Door Material: Stainless-steel sheet.

H. Door Style: Full Glass with frame.

I. Door Glazing: Acrylic or Tempered.
   1. Acrylic Color: Clear, transparent.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
   1. Provide projecting lever handle.
   2. Provide proprietary emergency release cam lock.
   3. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

K. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
   3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
      a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
         1) Location: Applied to cabinet door.
         2) Application Process: Pressure-sensitive vinyl letters.
         3) Lettering Color: Black.
         4) Orientation: Vertical.

L. Finishes:
   1. Manufacturer's standard baked-enamel paint for the following:
      a. Interior of cabinet, white.
   2. Stainless Steel: No. 4 finish.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of existing fire extinguishers indicated, with plated or baked-enamel finish.
1. Color: Black.
2. Provide where no cabinet is shown.

2.4 AED RECESSED CABINET

A. General: Provide standard sized cabinet for recessed wall installation with battery powered alarm and keyed controlled access. Cabinet shall be marked “Emergency Defibrillator”, door shall have clear acrylic window and sound alarm when door is opened without key override.
1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
2. Construction: Powered coated steel.
3. Inside Dimensions: 14 inches high, 14 inches wide and 6 inches deep.
4. Outside Dimensions: 17-1/2 by 17-1/2 inch by .937 face frame depth.
5. Rough Opening: 15 by 15 by 6-1/4 inches.
6. Basis of Design Product: Allied Medical Products, Standard Sized, Recessed, Alarmed cabinet. Available from www.aedsuperstore.com 1-800-544-0048
7. Quantity: Provide 1 units to be located in field by Architect/ Owner.

2.5 FIREMAN'S KEY BOX

A. General: Provide one unit complying with the following, in location directed by Architect.
1. Product: Knox-Box 3200 Series Recessed Mount with Recessed Mounting Kit (RMK)**;** Knox Company, Irvine CA, (800) 552-5669.
2. Construction: 1/4 inch plate steel housing, 1/2 inch thick steel door with interior gasket seal and hinge (not lift off door).
a. Capacity: Capable of storing 10 standard keys and 4 elevator keys.
b. Exterior Finish Color: Black.
c. Keying and Security: Prepare unit with keying standardized according to requirements of authorities having jurisdiction

PART 3 - EXECUTION

3.1 STORAGE

A. Carefully store and protect extinguishers and cabinets from theft, damage or unauthorized use.

3.2 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

3.3 PREPARATION

A. Prepare recesses for fire-protection cabinets as required by type and size of cabinet and trim style.

3.4 INSTALLATION

A. General: Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights indicated below:
   1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.
   2. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
   1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire-protection cabinets.
   2. Provide inside latch and lock for break-glass panels.
   3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

D. Identification: Apply vinyl lettering at locations indicated.

3.5 INSTALLATION OF FIREMAN'S KEY BOX

A. Install box in accordance with manufacturer's requirements. Fully recess box and securely attach to structure to prevent tampering.

3.6 ADJUSTING AND CLEANING

A. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

B. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer. Use plastic polish to remove fine scratches from acrylic bubbles.

C. Replace fire-protection cabinets and fireman's key boxes that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 00

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Knocked-down lockers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For metal lockers.

1. Include plans, elevations, sections, and attachment details.
2. Include locker identification system and numbering sequence.

C. Samples: For each color specified.

1.4 INFORMATIONAL SUBMITTALS

A. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in ICC A117.1.

2.2 KNOCKED-DOWN CORRIDOR LOCKERS

A. Basis of design: PENCO Guardian Plus Lockers or equal as approved by architect.

B. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Republic Storage Products Corridor Lockers
   2. List Industries Heavy-Duty Corridor (HDC) Lockers

C. Configuration:
   1. Size: As shown on drawings
   2. Tier: As shown on drawings

D. Doors: One piece; fabricated from 14-gauge 0.0747-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
   1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
   2. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.
   3. Door Style: manufacturers standard Vented panel

E. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:

   1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
   2. Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
   3. Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.

F. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.

G. Hinges:
   1. Continuous Hinges: Manufacturer's standard, steel, full height.

H. Door Handle and Latch: Recessed Finger-lift control handle in door.

   1. Pocket: brushed stainless steel securely fastened to door with two tabs and a positive tamper-resistant decorative fastener; of depth sufficient to prevent a combination padlock, built-in combination lock, or key lock from protruding beyond door face.

2. Provide lock hole cover plate for use with padlocks.
3. Latching Mechanism: Manufacturer's standard, multi-point rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

I. Locks: Built-in three-number dialing combination locks capable of at least five different combinations changes; provide control key, combination change key, and combination control charts.

J. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.

K. Hooks: Manufacturer's standard ball-pointed hooks, aluminum or steel; zinc plated.

L. Continuous Base: See drawings for material.

M. Filler Panels: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.

N. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet.

O. Continuous Sloped Hoods: See drawings for material.

1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

P. Finish: Baked enamel or powder coat.

1. Color: As selected by Architect from manufacturer's full range.

2.3 FABRICATION

A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. Equipment: Provide each locker with an identification plate and the following equipment:

1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
3. Triple-Tier Units: One double-prong ceiling hook.

D. Knocked-Down Construction: Fabricate metal lockers by assembling at Project site using manufacturer's nuts, bolts, screws, or rivets.

E. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches above the floor.

2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.

F. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.

G. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.

H. Boxed End Panels: Fabricated with 1-inch-wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.

I. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install lockers level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
3. Anchor back-to-back metal lockers to floor.

B. Knocked-Down Lockers: Assemble with manufacturer's standard fasteners, with no exposed fasteners on door faces or face frames.

C. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach recess trim to recessed metal lockers with concealed clips.
2. Attach filler panels with concealed fasteners.
3. Attach sloping-top units to metal lockers, with closures at exposed ends.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and latches to operate without binding. Verify that latches are operating satisfactorily.

B. Touch-up with factory-supplied paint and repair or replace damaged products before substantial completion.

END OF SECTION 105113

SECTION 10 75 00 - FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes ground-mounted flagpoles made from aluminum.

B. Related Sections:
1. Division 03 Sections for “Cast in Place Concrete” for flagpole footing.
2. Division 26 Section "Lighting" for site lighting fixtures.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
1. Wind Loads: Refer to code mandated criteria as indicated on the Structural plans.
2. Base flagpole design on polyester flags of flag size indicated.

B. Seismic Performance: Refer to code mandated criteria as indicated on the Structural plans.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For flagpoles. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
1. Include section, and details of foundation system for ground-mounted flagpoles.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For qualified professional engineer.

F. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Flagpole; a Kearney-National Inc. company.
2. Baartol Company.
3. Concord Industries, Inc.
4. Ewing Flagpoles.
5. Pole-Tech Company Inc.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
3. Provide self-aligning, snug-fitting joints.

B. Exposed Height: See drawings for height.

C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.

D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
1. Provide flashing collar of same material and finish as flagpole.

2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
1. 0.063-inch spun aluminum with gold anodic finish.

B. Internal Halyard, Cam Cleat System: 5/16-inch- diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock.

1. Access door lock shall be compatible with and accept Best cylinder, or shall accept Best cores as specified in Division 08 Section “Door Hardware”. Finish truck assembly to match flagpole.
2. Halyard Flag Snaps: Provide two chromium-plated bronze or stainless-steel swivel snap hooks per halyard.
   a. Provide with neoprene or vinyl covers.

2.4 FLAG

A. Polyester, United States of America.
   1. Size: 6 by 10 feet.

2.5 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Sand: ASTM C 33, fine aggregate.

D. Elastomeric Joint Sealant: Single-component nonsag urethane joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Place concrete, as specified in Division 03 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.
   1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 10 75 00

SECTION 11 33 00 - RETRACTABLE LADDER

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes manually operated retractable metal ladder for roof access.

1.2 SUBMITTALS

A. Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.

B. Installation methods.

C. Shop Drawings for Ladders:
1. Plan and section of ladder installation.
2. Indicate rough mounting dimensions for ceiling and/or roof openings.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store ladders until installation inside under cover in manufacturer's unopened packaging. If stored outside, under a tarp or suitable cover.

1.4 WARRANTY

A. Limited Warranty: Five year against defective material and workmanship, covering parts only. Defective parts, as deemed by the manufacturer, will be replaced at no charge, freight excluded, upon inspection at manufacturer's plant.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: ALACO Ladder Co., 5167 G Street, CA 91710-5143, www.alacoladder.com

2.2 FOLDING WALL LADDER.

A. General: Provide Folding wall ladder.
1. Model: HP70 (460) ladder designed for roof hatch access.

B. Performance Standard:
1. ANSI A14.3
2. Ladder capacity shall be rated at 500 lbs.

C. Accessories:
1. 1 ¼ inch round flush handrails.
2. Non marking rubber feet.

D. Components:

1. Ladder Stringer: 6005-T6 aluminum. Pitch shall be 70°.
2. Stairway Tread: 6005-T6 3 inch or 4 inch wide flat steps with nonslip ridges, mounted on 12 inch centers.
3. Railing: Aluminum bar handrail riveted to stringers, upper section only.
4. Hardware:
   a. Mounting brack with slide assembly for folding ladder against wall.
5. Finishes: Mill finish on aluminum components.

2.3 FABRICATION

A. Completely fabricate ladder ready for installation before shipment to the site.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until rough opening and structural support have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.3 ADJUSTING

A. Adjust unit for smooth binding free operation.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 11 33 00

SECTION 114000 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes equipment for foodservice facilities.

B. Related Requirements:

1. Section 12 36 16 "Metal Countertops" for Concessions area.

2. Division 22 “Plumbing Fixtures” for faucets associated with sinks.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For foodservice facilities.

1. Indicate locations of foodservice equipment and connections to utilities.
2. Key equipment using same designations as indicated on Drawings.
3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.

B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the District of other rights the District may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

B. All buy out food service equipment herein specified shall have all parts and labor warranted in writing, from the date of Final Acceptance by the District against defective parts, materials, workmanship and design for a period of time as stated within the manufacturers standard published warranty, but no less than two years.

C. All custom fabricated food service equipment shall be warranted as stated above except for a period of two years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

2.2 ACCESSORIES

A. Cabinet Hardware: Provide NSF-certified stainless steel hardware for equipment items as indicated.

B. Casters: NSF-certified standard-duty stainless-steel swivel stem casters with 5-inch (125-mm) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width and 300-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

2.3 STAINLESS STEEL FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal products" for recommendations relative to applying and designating finishes.
   1. Remove or blend tool and die marks and stretch lines into finish.
   2. Grind and polish surfaces to produce uniform directional textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. Concealed Surfaces: Minimum of 80 grit finish.

C. Exposed Surfaces: No. 4 finish (bright, directional polish) of 180 grit.

D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

E. Protect mechanical finishes on exposed surfaces from damage by applying a strippable temporary protective covering before shipment.

2.4 FOODSERVICE EQUIPMENT

A. Manufacturer:
   1. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   2. Basis-of-Design product: Advance Tabco, see drawing for model numbers of products to be provided.
   3. Alternate manufacturers:
      a. Eagle Group
      b. Aero Manufacturing

2.5 MISCELLANEOUS MATERIALS

A. Installation Accessories, General: NSF certified for end-use application indicated.

B. Elastomeric Joint Sealant: ASTM C920; silicone. Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.

   1. Public Health and Safety Requirements:

      a. Sealant is certified for compliance with NSF standards for end-use application indicated.
      b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

   2. Cylindrical Sealant Backing: ASTM C1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

2.6 FINISHES

A. Stainless Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.

B. Powder-Coat Finishes: Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.

   1. Connect equipment to utilities.
   2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

END OF SECTION 114000

SECTION 12 24 13 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually operated solar roller shades with single rollers .

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
   a. Provide shade drive layout drawing showing locations of shade drivers and power requirements.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Project Record Documents: Record actual installed locations and settings for shade controls.

C. Warranty: Submit manufacturer’s warranty and documentation of final executed warranty completed in Owner’s name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.8 WARRANTY

A. Manufacturer's Warranty: 25-Year Commercial Warranty transferrable to the building owner.

PART 2 - PRODUCTS

2.1 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Products: Subject to compliance with requirements, provide one of the following products:
   1. MechoShade Systems, LLC - Mecho/5 Manual Shade System
   2. Draper, Inc. - Clutch-Operated FlexShade NEXD
   3. Rollease Acmeda Contract – Contract Series

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

   1. Chain-Retainer Type: Chain tensioner, jamb mounted.
      a. Chain tensioning device as required and complying with ANSI/WCMA A 100.1-2022.
   2. Adjustment free continuous #10 stainless steel ball bead chain rated to 120-pound tensile strength. Plastic bead chains not acceptable.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

   1. Roller Drive-End Location: Right side of interior face of shade unless noted otherwise on drawing.
   2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Shadebands:

   1. Shadeband Material: Light-filtering fabric.

2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

    a. Type: Enclosed in sealed pocket of shadeband material.

F. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
    a. Provide for all shades mounted below ceiling unless otherwise noted.
2. Endcap Covers: To cover exposed endcaps.
    a. Provide for all shades with exposed hardware unless otherwise noted.
3. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
    a. Provide for all shades mounted above ceiling unless otherwise noted.
4. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.2 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.
2. Type: Vinyl coated fiberglass fabric
3. Roll Width: Varies, coordinate with window width and/or window mullion locations.
4. Orientation on Shadeband: Railroaded.
5. Openness Factor: 1 percent, unless noted otherwise.
6. Style/Color/Weave: If not indicated in drawings, provide options comparable to the following:
    a. Mecho – ThermoVeil 1%
    b. Draper – E-Screen 1%
    c. Rollease – KleenScreen 1%
7. Blackout – Provide manufacturer’s standard options where 0% openness is required.
    a. Mecho – Chelsea
    b. Draper - Flocke
    c. Rollease – Mesa Facade

2.3 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
2. Skylight Shades: Provide battens and seams at uniform spacings along shadeband as required to ensure shadeband tracking and alignment through its full range of movement without distortion or sag of material.
3. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

D. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.2 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.3 CLEANING

A. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 12 24 13

SECTION 123616 - METAL COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stainless-steel countertops.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For metal fabrications.

1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
2. For countertops, show locations and sizes of cutouts and holes for items installed in metal countertops.

PART 2 - PRODUCTS

2.1 STAINLESS-STEEL FABRICATIONS

A. Countertops: Fabricate from 0.062-inch- (1.59-mm-) thick, stainless-steel sheet. Provide smooth, clean exposed tops and edges in uniform plane, free of defects. Provide front and end overhang of 1 inch (25 mm) over the base cabinets.

1. Joints: Fabricate countertops in sections for joining in field, with joints at locations indicated.
2. Weld shop-made and field joints for continuous top.
3. Sound deaden the undersurface with heavy-build mastic coating.
4. Extend the top down to provide a 1-inch- (25-mm-) thick edge with a 1/2-inch (12.7-mm) return flange.
5. Form the backsplash coved to and integral with top surface, with a 1/2-inch- (12.7-mm-) thick top edge and 1/2-inch (12.7-mm) return flange.
6. Provide raised (marine) edge around perimeter of tops.

2.2 MATERIALS

A. Stainless-Steel Sheet: ASTM A240/A240M, Type 316L.

B. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 079200 "Joint Sealants" and the following:

1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.

2.3 STAINLESS-STEEL FINISH

A. Grind and polish surfaces to produce uniform, directional satin finish matching No. 4 finish, with no evidence of welds and free of cross scratches. Run grain with long dimension of each piece. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces clean.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal countertops level, plumb, and true; shim as required, using concealed shims.

B. Field Jointing: Where possible, make field jointing in the same manner as shop jointing; use fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.

C. Secure countertops to cabinets with Z- or L-type fasteners or equivalent; use two or more fasteners at each front, end, and back.

D. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.

E. Seal junctures of countertops, splashes, and walls with sealant for countertops.

F. Protection: Provide 6-mil (0.15-mm) plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches (1220 mm) o.c. Remove protection at Substantial Completion.

END OF SECTION 123616

SECTION 12 36 61 - SOLID SURFACING MATERIALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid Surface Material (SSM)
   a. Window Sills and aprons

B. Related Spec. Sections:
1. Section 06 41 16 – Plastic-Laminate-Clad Architectural Cabinets and Countertops

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials and sinks, where noted in drawings.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples: For each type of material exposed to view in manufacturer’s standard size.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.6 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.7 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID SURFACE MATERIAL (SSM)

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ISFA 2-01.

1. Basis of Design:
   a. DuPont-Corian Solid Surface
2. Substitutions: Alternative products that meet performance and design criteria of BOD product above, are acceptable from the following manuf.:
   1) Wilsonart LLC
   2) Formica
   3) Meganite Inc.
3. Colors and Patterns: As selected by Architect from manufacturer's full range in Price Group #2, unless noted otherwise in drawings.
   a. Or similar pricing grade by other manuf.

B. Countertops
1. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
   a. Grade: Custom.
2. Configuration:
   a. Front: Straight, slightly eased at top
   b. Backsplash: Straight, slightly eased at corner
   c. End Splash: Matching backsplash
3. Countertops:
   a. 1/2-inch-thick, solid surface material slab with front edge built up to 1 ¼” inch thick, unless noted otherwise in drawings.
4. Backsplashes:
   a. 1/2-inch-thick by 4 inches high, unless noted otherwise in drawings.
5. Fabricate tops with shop-applied edges, unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
   a. Fabricate with loose backsplashes for field assembly.
   b. Install integral sink bowls in countertops in the shop.
6. Joints:
   a. Fabricate countertops without joints up to 120 inches.
   b. Where countertops are longer than 120 inches, fabricate countertops in sections for joining in field

1) Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
2) Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

7. Cutouts and Holes:
   a. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
      1) Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
   b. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
8. Counter Perimeter Frame: Ensure 3/4" thick, moisture resistant cores
   a. For counter tops in wet areas having sinks or lavatories are 3/4" thick exterior grade plywood with waterproof adhesive, Fir or Poplar plywood, veneer core only.
      1) Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
   b. MDF core conforming to ANSI/NPA A208.2 balanced design, manufactured from recycled materials, meeting ANSI Standards for emissions, of minimum density of 48 lb/cu ft and surface character to match sample approved by Architect. Ensure fire retardant Product contains fire-retardant chemicals injected with raw materials during manufacturing and achieves a maximum flame-spread rating of 25 with a maximum smoke development of 200 when tested to ASTM E84.
9. Structural Supports:
   a. Refer to Technical Bulletin K-25291 – Corian Solid Surface Structural Support.
10. Sealant:
   a. Mildew-resistant, FDA/UL®
   b. NSF/ANSI 51 compliant in Food Zone area, recognized silicone color matched sealant or clear silicone sealants.

C. Window Sills & Aprons:
   1. Thickness: ½ inch thick sill, eased edges, with 1 inch overhang from face of wall finish.
   2. Provide solid surface apron, 3 inches high
   3. Adhesively joined with inconspicuous seams.
   4. Color/Pattern: To be selected by Architect from manufacturer’s full color range in Price Group #2.

2.2 INSTALLATION MATERIALS

A. Adhesive:
   1. Product recommended by solid surface material manufacturer.
   2. Product recommended by quartz agglomerate manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface / quartz agglomerate material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet , 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
   1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

   1. Seal edges of cutouts in particleboard subtops by saturating with varnish.

I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 12 36 61

SECTION 32 31 20 - ORNAMENTAL PICKET FENCE AND GATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General Conditions and Division 01 Specification sections, apply to work of this section.

1.2 SUMMARY

A. This Section Includes:

1. Ornamental picket fence system.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include material descriptions, construction details, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Include plans, elevations, sections, details, required installation clearances, and details of post anchorages.

C. Samples for Initial Selection: Actual color samples on materials to be furnished for Architects selection from the manufacturer's full range of colors.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed ornamental picket fencing and gates similar in material, design, and extent to those indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Preinstallation Conference: Conduct conference at project site to comply with requirements in Division 01 Section "Project Meetings".

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify layout information for ornamental picket fence and gates shown on the Drawings in relation to masonry pier locations. Verify dimensions by field measurements.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of ornamental picket fence that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

B. Provide manufacturer's standard limited warranty that its ornamental fence system is free from defects in material finish including cracking, peeling, blistering and corroding within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the work include, but are not limited, to the following:

1. Ameristar Fence Products, Inc.; Montage Plus.

a. Configuration: Montage Commercial 4-Rail Design.
1) Invincible style fence at typical conditions
2) Classic style fence and gate at canopy / entry conditions

2.2 MATERIALS

A. Steel material for fence framework posts, and pickets shall be galvanized prior to forming according to ASTM A 924, with minimum yield strength of 45,000 psi. Steel shall be hot-dip galvanized according to ASTM A 635 with a minimum zinc coating weight of 0.60 oz./sq. ft., with Coating Designation G-60.

2.3 ORNAMENTAL PICKET FENCE

A. Pickets: Minimum picket size shall be 3/4 inch, 14 gage tubing. Picket spacing shall be 4.675 inches o.c.

B. Rails: Manufacturer's standard U-channel design with outside cross-section dimensions of 1-1/2-inch by 1-7/16-inch and a minimum thickness of 14 gage.

C. Posts: Square tubular members with minimum post sizes as follows:

1. Panel height up to and including 6 Feet: 2-1/2 inch square; 16 gage.

D. Fabrication:

1. Pickets, rails, and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.
2. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be jointed at each picket-to-rail intersection by manufacturer's standard fusion welding process.
3. The manufactured fence systems shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for commercial weight fences under ASTM F2408.

2.4 GATES

A. Fabrication: Gates with an out to out leaf dimension less than and including 72 inches shall be fabricated using manufacturer's ornamental panel material and 1-3/4" sq. x 14 gauge gate ends. All rail and upright intersections, and picket and rail intersections shall be joined by welding.

B. Gate Posts: Furnish posts for supporting single gate leaf for nominal gate widths as follows:

1. Up to 4 Feet:

   a. 2-1/2 inches square by 14 gage for gate heights up to 4 feet.
   b. 3 inches square by 12 gage for gate heights 4 feet to 6 feet.

2. 4 Feet to 6 Feet:

   a. 3 inches square by 12 gage for gate heights up to 6 feet.

C. Gate Hardware: Galvanized steel or malleable iron shapes to suit gate size.

1. Hinges: Structurally capable of supporting gate leaf and allow opening and closing without binding. Non-lift-off type hinge design shall permit gate swing 180 degrees.
2. Latch: Capable of retaining gate in closed position and have provision for padlock.
3. Keeper: Provide keeper for each gate leaf over 5' wide. Gate keeper shall consist of mechanical device for securing free end of gate when in full open position.
4. Double Gates: Provide drop rod to hold inactive leaf. Provide gate stop pipe to engage center drop rod. Provide locking device and padlock eyes as an integral part of latch, requiring one padlock for locking both gate leaves.

2.5 FINISHES

A. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash (with zinc

phosphate), followed by a duplex application of an epoxy primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils.

1. Color: Black.

2.6 GROUT AND ANCHORING CEMENT

A. Concrete: Provide concrete consisting of Portland cement, ASTM C 150, aggregates ASTM C 33, and clean water. Mix materials to obtain concrete with a minimum 28-day compressive strength of 3000 psi. Use at least 4 sacks of cement per cubic yard, 1-inch maximum size aggregate, maximum 3-inch slump, and 2 to 4 percent entrained air.

B. Grout: Nonmetallic, non-corrodible, non-shrink, factory blended and packaged; complying with ASTM C 1107; recommended by manufacturer for exterior use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for concrete work, and other conditions affecting performance of the Work.

B. Do not begin installation before final grading is completed, unless permitted by the Architect.

3.2 INSTALLATION

A. Install fence in accordance with manufacturer’s written instructions.

B. Space posts uniformly at 8’-0” maximum face to face unless otherwise indicated.

1. For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade.

C. Fence panels shall be attached to posts with brackets supplied by the manufacturer.

D. Concrete Set Posts: Drill hole in firm, undisturbed or compacted soil. Holes shall have diameter four times greater than nominal outside dimension of post, and depths approximately 6 inches deeper than post bottom. Excavate deeper as required for adequate support in soft and loose soils, and for posts with heavy lateral loads. Set post bottom 36 inches below surface when in firm, undisturbed soil. Place concrete around post in a continuous pour. Trowel finish around posts and slope to direct water away from posts.

E. Check each post for vertical and top alignment, and maintain in position during placement and finishing operation.

3.3 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.4 ADJUSTING AND PROTECTION

A. Adjust gate to operate smoothly and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, disruption, or malfunction, throughout entire operation range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Protect complete installation against damage until the date of substantial completion.

END OF SECTION

SECTION 33 46 00 - SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes subdrainage systems for building and site retaining walls.

B. Collection and conduction piping for subdrainage system.

1.2 SUBMITTALS

A. Product Data: For each type of drainage panel indicated.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to the "Piping Applications" Article in Part 3 for applications of pipe, fitting, and joining materials.

2.2 PERFORATED-WALL PIPES AND FITTINGS

A. Perforated PE Pipe and Fittings: ASTM F 405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
   1. Couplings: Manufacturer's standard, band type.

2.3 SOLID-WALL PIPES AND FITTINGS

A. PE Drainage Tubing and Fittings: AASHTO M 252, Type S, corrugated, with smooth waterway, for coupled joints.
   1. Couplings: AASHTO M 252, corrugated, band type, matching tubing and fittings.

B. PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints.
   1. Provide Schedule 40 pipe and fittings.

2.4 SPECIAL PIPE COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant metal tension band and tightening mechanism on each end.
   1. Unshielded Flexible Couplings: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant metal tension band and tightening mechanism on each end.
   2. Shielded Flexible Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant metal tension band and tightening mechanism on each end.

2.5 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M; with round-flanged, cast-iron housing; and secured, scoriated, Medium-Duty Loading class, cast-iron cover. Include cast-iron ferrule and countersunk, brass cleanout plug.

2.6 DRAINAGE PANELS

A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, 36 to 60 inches wide with drainage core faced with geotextile filter fabric.
   1. Manufacturers:
      a. American Wick Drain Corporation.
      b. Eljen Corp.
      c. Greenstreak, Inc.
      d. JDR Enterprises, Inc.
      e. Midwest Diversified Technologies Incorporated.
      f. TC Mirafi.
   2. Drainage Core: Three-dimensional, nonbiodegradable, molded PP or PS.
      a. Minimum Compressive Strength: 10,000 lbf/sq. ft. when tested according to ASTM D 1621.
      b. Minimum In-Plane Flow Rate: 7 gpm/ft. of unit width at hydraulic gradient of 1.0 and compressive stress of 25 psig when tested according to ASTM D 4716.
   3. Filter Fabric: Woven or Nonwoven needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined according to AASHTO M 288:
      a. Survivability: Class 1.
      b. Apparent Opening Size: No. 40 sieve, maximum.
      c. Permittivity: 0.5 per second, minimum.
   4. Film Backing: Polymeric film bonded to drainage core surface.

2.7 SOIL MATERIALS

A. Backfill, drainage course, impervious fill, and satisfactory soil materials are specified in Division 31 Section "Earth Moving."

2.8 GEOTEXTILE FILTER FABRICS

A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
   1. Structure Type: Nonwoven, needle-punched continuous filament or woven, monofilament or multifilament.
   2. Style(s): Flat and sock.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving."

3.2 PIPING APPLICATIONS

A. Underground Subdrainage Collection Piping:

1. Perforated PE pipe and fittings, couplings, and coupled joints.

B. Underground Subdrainage Conductor Piping:
1. PE pipe and fittings, couplings, and coupled joints.

3.3 CLEANOUT APPLICATIONS

A. In Underground Subdrainage Piping:
1. At Grade in Earth: Cast-iron cleanouts.
2. At Grade in Paved Areas: Cast-iron cleanouts.

3.4 RETAINING-WALL DRAINAGE INSTALLATION

A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.

B. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with adhesive or tape.

C. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.

D. Add drainage course to width of at least 6 inches on side away from wall and to top of pipe to perform tests.

E. After satisfactory testing, cover drainage piping to width of at least 6 inches on side away from footing and above top of pipe to within 12 inches of finish grade.

F. Place drainage course in layers not exceeding 3 inches in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.

G. Place layer of flat-style geotextile filter fabric over top of drainage course, overlapping edges at least 4 inches.

H. Install drainage panels on formed in place concrete retaining walls as follows:
1. Coordinate placement with other drainage materials.
2. Lay perforated drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
3. If weep holes are used instead of drainage pipe, cut 1/2-inch- diameter holes on core side at weep-hole locations. Do not cut fabric.
4. Mark horizontal chalk line on wall at a point 6 inches less than panel width above footing bottom. Before marking wall, subtract footing width.
5. Separate 4 inches of fabric at beginning of roll and cut away 4 inches of core. Wrap fabric around end of remaining core.
6. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Place nails from 2 to 6 inches below top of panel, approximately 48 inches apart. Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails. Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
7. If another panel is required on same row, cut away 4 inches of installed panel core and wrap fabric over new panel.
8. If additional rows of panel are required, overlap lower panel with 4 inches of fabric.
9. Cut panel as necessary to keep top 12 inches below finish grade.

10. For inside corners, bend panel. For outside corners, cut core to provide 3 inches for overlap.

I. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding 6 inches. Thoroughly compact each layer. Fill to finish grade.

3.5 PIPING INSTALLATION

A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
1. Foundation Subdrainage: Install piping level with footings with no high or low spots and with a minimum cover of 36 inches, unless otherwise indicated.
2. Underground Rainwater Conductors: Install piping pitched down in direction of flow, at a minimum slope of 1 percent.
3. Lay perforated pipe with perforations down.
4. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.

B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.

C. Install PE piping according to ASTM D 2321.

3.6 PIPE JOINT CONSTRUCTION

A. Join PE pipe, tubing, and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26 .4 .2.4, "Joint Properties."

B. Join perforated, PE pipe and fittings with couplings for soil-tight joints according to AASHTO's "Standard Specifications for Highway Bridges," Division II, Section 26 .4 .2.4, "Joint Properties"; or according to ASTM D 2321.

C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.7 CLEANOUT INSTALLATION

A. Cleanouts for Foundation Subdrainage:
1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
2. In vehicular-traffic areas, use Schedule 40 PVC soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 18 by 18 by 12 inches in depth. Set top of cleanout flush with grade.
3. In nonvehicular-traffic areas, use Schedule 40 PVC pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, 12 by 12 by 4 inches in depth. Set top of cleanout plug 1 inch above grade.

B. Cleanouts for Underground Rainwater Conductors:
   1. Set cleanouts in landscaped areas in concrete footing no less than 12 inches larger than cleanout and extended down to no less than 3 feet below grade.
   2. Install cleanouts and riser extensions from piping to top of grade. Locate cleanouts at at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
   3. Use Schedule 40 PVC soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of grade.

3.8 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Carry foundation drains and underground rainwater conductors to daylight.

3.9 FIELD QUALITY CONTROL

A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.10 CLEANING

A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 33 46 00

SECTION 20 01 00 - GENERAL PROVISIONS - MECHANICAL

1. GENERAL

A. The Advertisement for Bids, Instructions to Bidders, Bidding Requirements, General, Special and Supplementary Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of their Sub-Contractor's work. All manufacturers, suppliers, fabricators, contractors, etc. submitting proposals to any part if for work, services, materials or equipment to be used on or applied to this project are hereby directed to familiarize themselves with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.

B. Each Proposer shall also be governed by any unit prices and Addenda insofar as they may affect their part of the work or services.

C. The work included in this division consists of the furnishing of all labor, equipment, transportation, excavation, backfill, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Mechanical System(s) indicated or specified in the Contract Documents.

D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Mechanical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.

E. It is not the intent of this section of the specifications to make any Contractor, other than the General Contractor, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be routed through the General Contractor to the Architect (if applicable), then to the Engineer. Also, this section of the specifications shall not be construed as an attempt to arbitrarily assign responsibility of work, material, equipment or services to a particular trade or Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be optional.

F. It is the intent of this Contract to deliver to the Owners a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials required for the complete installation without additional cost to the Owner.

G. In general, and to the extent possible, all work shall be accomplished without interruption of existing facilities operations. The Contractor shall advise the Owners at least two weeks prior to the interruption of any services or utilities. The Owners shall be advised of the exact time that interruption will occur and the length of time the interruption will last. Failure to

comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.

H. Definitions and Abbreviations

(1) Contractor - Any Contractor whether proposing or working independently or under the supervision of a General Contractor and/or Construction Manager and who installs any type of mechanical work (Controls, Plumbing, HVAC, Sprinkler, Gas Systems, etc.) or, the General Contractor.

(2) Engineer - The Consulting Mechanical-Electrical Engineers either consulting to the Owners, Architect, other Engineers, etc. In this case: CMTA, Inc., Consulting Engineers.

(3) Architect - The Architect of Record for the project.

(4) Furnish - Deliver to the site in good condition and turn over to the Contractor who is to install.

(5) Provide - Furnish and install complete, tested and ready for operation.

(6) Install - Receive and place in satisfactory operation.

(7) Indicated - Listed in the Specifications, shown on the Drawings or Addenda thereto.

(8) Typical - Where indicated repeat this work, method or means each time the same or similar condition occurs whether indicated or not.

(9) Contract Documents - All documents pertinent to the quality and quantity of work to be performed on this project. Includes, but not limited to: Plans, Specifications, Instructions to Bidders, General and Special Conditions, Addenda, Alternates, Lists of Materials, Lists of Sub-Contractors, Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Schedules of Value, Periodical Payment Requests, Construction Contract with Owners, etc.

(10) Proposer - Any person, agency or entity submitting a proposal to any person, agency or entity for any part of the work required under this contract.

(11) OSHA - Office of Safety and Health Administration.

(12) SBC - State Building Code.

(13) The Project - All of the work required under this Contract.

(14) NEC - National Electrical Code.

(15) NFPA - National Fire Protection Association.

(16) ASME - American Society of Mechanical Engineers.

(17) AGA - American Gas Association.

(18) SMACNA - Sheet Metal and Air Conditioning Contractors National Association.

(19) ANSI - American National Standards Institute.

(20) ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.

(21) NEMA - National Electrical Manufacturers Association.

(22) UL - Underwriters Laboratories.

(23) ADA - Americans with Disabilities Act.

(24) IMC - International Mechanical Code.

(25) IECC - International Energy Conservation Code.

(26) IFGC - International Fuel Gas Code.

I. Required Notices:

(1) Ten days prior to the submission of a proposal, each proposer shall give written notice to the Engineer of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted. In the absence of such written notice, Proposers signify that they have included the cost of all required items in the proposal and that the Proposer will be responsible for the safe and satisfactory operation of the entire system.

2. INTENT

A. It is the intention of the Contract Documents to call for finished work, tested and ready for operation.

B. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

3. DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item which

may be necessary to complete the systems. All proposers shall anticipate that additional items may be required and submit their bid accordingly.

B. The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parts of either. Should this condition exist, the Proposer shall request a clarification not less than twelve days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be final.

C. The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

D. Contractor shall make all their own measurements in the field and shall be responsible for correct fitting. They shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

E. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.

F. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that they is to be relieved of the work which is specified under their branch until instructions in writing are received from the Engineer.

G. Unless dimensioned, the mechanical drawings only indicate approximate locations of equipment, piping, ductwork, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to ensure no conflict with other work.

H. Each Proposer shall review all drawings including Architectural, Mechanical, Electrical, Fire Protection, Landscaping, Structural, Surveys, etc., to ensure that the work they intend to provide does not encroach a conflict with or affect the work of others in any way. Where such effect does occur, it shall be the Proposer's responsibility to satisfactorily eliminate any such encroachment conflict or effect prior to the submission of their proposal. Each Proposer shall in particular ensure that there is adequate space to install their equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded the proposer and shall be accomplished fully without expense to others and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to ensure adequate spaces.

I. Where on the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be

continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.

J. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

K. Where on the Drawings or Addenda the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.

L. Special Note: Always check ceiling heights indicated on Architectural Drawings and Schedules and ensure that they may be maintained after all mechanical and electrical equipment is installed. Do not install equipment in the affected area until the conflict is resolved.

4. EXAMINATION OF SITE AND CONDITIONS

A. Each Proposer shall inform themself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. Each Proposer shall also fully acquaint themselves with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of utilities, etc. Their proposal shall cover all expenses or disbursements in connection with such matters and conditions. No allowance will be made for lack of knowledge concerning such conditions after bids are accepted.

5. EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

A. When any Contractor requests approval of materials and/or equipment of different physical size, capacity, function, color, access, it shall be understood that such substitution, if approved, will be made without additional cost to anyone other than the Contractor requesting the change regardless of changes in connections, space requirements, electrical characteristics, electrical services, etc., from that indicated. In all cases where substitutions affect other trades, the Contractor requesting such substitutions shall advise all such Contractors of the change and shall remunerate them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Review of Shop Drawings by the Engineers does not in any way absolve the Contractor of this responsibility.

B. Notwithstanding any reference in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make or catalog number, such reference shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition; any devices, products, materials, fixtures, forms, or types of construction which, in the judgment of the Engineer, are equivalent to those specified are acceptable, provided

the provisions of Paragraph (A) immediately preceding are met. Requested substitutions shall be submitted to the Engineer a minimum of twelve days prior to bids.

C. Wherever any equipment and material is specified exclusively only such items shall be used unless substitution is accepted in writing by the Engineers.

D. Each Proposer shall furnish along with their proposal a list of specified equipment and materials which they are to provide. Where several makes are mentioned in the specifications and the Contractor fails to state which they propose to furnish, the Engineer shall choose any of the makes mentioned without change in price. Inclusion in this list shall not ensure that the Engineers will approve shop drawings unless the equipment, materials, etc., submitted in shop drawings is satisfactorily comparable to the items specified and/or indicated.

6. SUPERVISION OF WORK

A. The Contractor shall personally supervise the work for which they are responsible or have a competent superintendent, approved by the Engineers, on the work at all times during progress with full authority to act for them.

7. CODES, RULES, PERMITS, FEES, INSPECTIONS, REGULATIONS, ETC.

A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, inspections and other costs, including all utility connections, meters, meter settings, taps, tap fees, extensions, water and/or sewer system development charge, etc. in connection with their work. They shall also file all necessary plans, prepare all documents and obtain all necessary approvals of all governmental departments and/or the appropriate municipality or utility company having jurisdiction, whether indicated or specified or not. They shall hire an independent Registered Engineer to witness installations and provide necessary certifications where required by utility companies, municipal agencies or others that have review authority. They shall also obtain all required certificates of inspection for their work and deliver same to the Engineers before request for acceptance and final payment for the work. Ignorance of Codes, Rules, Regulations, Laws, etc. shall not render the Contractor irresponsible for compliance. The Contractor shall also be versed in all Codes, Rules and Regulations pertinent to their part of the work prior to submission of a proposal.

B. The Contractor shall include in their work, without extra cost, any labor, materials, services, apparatus and drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not indicated or specified.

C. All materials furnished and all work installed shall comply with the National Fire Codes of the National Fire Protection Association, with the requirements of local utility companies, or municipalities and with the requirements of all governmental agencies having jurisdiction.

D. All materials and equipment so indicated and all equipment and materials for the electrical portion of the mechanical systems shall bear the approval label of or shall be listed by the

Underwriters' Laboratories (UL), Incorporated. Each packaged assembly shall be approved as a package. Approval of components of a package shall not be acceptable. Where required by the Code and/or the Authority Having Jurisdiction, provide the services of a field labeling agency to provide a UL label for the entire system in the field under evaluation.

E. All plumbing work is to be constructed and installed in accordance with plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Department of Health. Plumbing work shall not commence until such plans are in the hands of the Contractor.

F. All Heating, Ventilation and Air Conditioning work shall be accomplished in accordance with the local Building Code and amendments thereto, the latest standards recognized by the American Society of Heating, Refrigerating and Air Conditioning and the National Fire Protection Association. Contractor shall secure a permit from the Division of HVAC. Final inspection certificate shall be provided by Contractor and a copy included in Operation and Maintenance Manuals.

G. The Contractor shall furnish three (3) copies of all Final Inspection Certificates obtained to the Engineer when work is complete. Final payment for work will be contingent upon compliance with t requirement.

H. Where minimum code requirements are exceeded in the Design, the Design shall govern.

I. The Contractor shall ensure that their work is accomplished in accord with the OSHA Standards and that they conduct their work and the work of their personnel in accord with same.

J. All work relating to the handicapped shall be in accord with regulations currently enforced by the local Building Code and the American Disabilities Act.

K. All work in conjunction with a natural gas installation shall, in addition to all other Codes, Rules, Regulations, Standards, etc., comply with the requirements of the local gas supplier and/or standards and recommendations of the American Gas Association.

L. All work in relation to domestic water systems shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the requirements of the local water utility company and the adopted edition of the 10 States Standards.

M. All work in relation to the installation of sanitary or storm sewers shall, in addition to all other Codes, Rules, Regulations and Standards, be in compliance with the local agency governing such installations and the adopted edition of the 10 States Standards.

N. All work relating to the handicapped shall be in accord with regulations currently enforced by the local Building Code and the American Disabilities Act.

8. EQUIPMENT AND PIPING SUPPORT

A. Each piece of equipment, apparatus, piping, or conduit suspended from the structure or mounted above the floor level shall be provided with suitable structural support, pipe stand, platform or carrier in accordance with the best recognized practice. Such supporting or mounting means shall be provided by the Contractor for all equipment and piping. Exercise extreme care that structural members of building are not overloaded by such equipment. Provide any required additional bracing, cross members, angles, support, etc., as indicated or required by the Structural Engineer. This, in some instances, will require the Contractor to add an angle to a joist to transfer the load to a panel point. If in doubt, contact the Structural Engineer.

9. DUCT AND PIPE MOUNTING HEIGHTS

A. All exposed or concealed ductwork, piping, etc., shall be held as high as possible unless otherwise noted and coordinated with all other trades. Exposed piping and ductwork shall, insofar as possible, run perpendicular or parallel to the building structure.

10. COST BREAKDOWNS (SCHEDULE OF VALUES)

A. Within thirty days after acceptance of the Contract, the Contractor shall furnish to the Engineer, one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made in a format approved by the Engineer. Payments will not be made until satisfactory cost breakdowns are submitted.

11. CORRECTION PERIOD

A. All equipment, apparatus, materials, and workmanship shall be the best of its respective kind. The Contractor shall replace all parts at their own expense, which are proven defective as described in the General Conditions. The effective date of completion of the work shall be the date of the Architect's or Engineer's Statement of Substantial Completion. Items of equipment which have longer guarantees, as called for in these specifications, shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall not invalidate the guarantee except that the Owner shall be liable for any damage to equipment during this period, due to negligence of their operator or other employees. Refer to other sections for any special or extra warranty requirements.

B. It is further clarified that all required and specified warranties shall begin on the date of Substantial Completion, not at the time of equipment start-up.

C. All compressors shall have five-year warranty.

12. COMPUTER-BASED SYSTEM SOFTWARE

A. For all equipment, controls, hardware, computer-based systems, programmable logic controllers, and other materials provided as a part of the work, software that is installed shall be certified in writing to the Engineer and Owner by the manufacturer and/or writer to be free of programming errors that might affect the functionality of the intended use.

13. CHANGES IN MECHANICAL WORK

REFER TO GENERAL AND SPECIAL CONDITIONS.

14. CLAIMS FOR EXTRA COST

REFER TO GENERAL AND SPECIAL CONDITIONS.

15. SURVEY, MEASUREMENTS AND GRADE

A. The Contractor shall lay out their work and be responsible for all necessary lines, levels, elevations and measurements. They must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from their failure to do so.

B. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the contract documents, they shall promptly notify the Engineer and shall not proceed with this work until they has received instructions from the Engineer on the disposition of the work.

16. TEMPORARY SERVICES

A. The Contractor shall arrange any temporary water, electrical and other services which they may require to accomplish their work. Refer also to General and Special Conditions.

17. RECORD DRAWINGS

A. The Contractor shall ensure that any deviations from the Design are as they occur recorded in red, erasable pencil on record drawings kept at the jobsite. The Engineer shall review the record documents from time to time to ensure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems. Also, pay particular attention to Deviations in the Control Systems and all exterior utilities. Keep information in a set of drawings, either hard copy of electronic pdf set aside at the job site especially for this purpose.

18. MATERIALS AND WORKMANSHIP

A. All equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. Each Proposer shall determine that the materials and/or equipment they proposes to furnish can be brought into the building(s) and installed within the space available. In certain cases, it may be necessary to remove and replace walls, floors and/or ceilings and this work shall be the responsibility of the Contractor. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement of filters, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s). Ensure, through coordination, that no other Contractor seals off access to space required for equipment, materials, etc.

B. Materials and equipment, where applicable, shall bear Underwriters' Laboratories label where such a standard has been established.

C. Use extreme care in the selection of equipment and its installation to ensure that noise and vibration are kept at a minimum. The Engineer's determination shall be final and corrections to such discrepancies shall be made at the cost of the Contractor.

D. Each length of pipe, fitting, trap, fixture and device used in the plumbing or drainage systems shall be stamped or indelibly marked with the weight or quality thereof and with the manufacturer's mark or name.

E. All equipment shall bear the manufacturer's name and address. All electrically operated equipment shall bear a data plate indicating required horsepower, voltage, phase and ampacity.

19. COOPERATION AND COORDINATION WITH OTHER TRADES

A. The Contractor shall give full cooperation to all other trades and shall furnish in writing with copies to the Engineer, any information necessary to permit the work of other trades to be installed satisfactorily and with the least possible interference or delay.

B. Where any work is to be installed in close proximity to, or will interfere with work of other trades, each shall cooperate in working out space conditions to make a satisfactory adjustment. If so directed by the Engineer, the Contractor shall prepare composite working drawings and sections at a suitable scale not less than 1/4” = 1'-0”, clearly indicating how their work is to be installed in relation to the work of other trades, or so as not to cause any interference with work of other trades. They shall make the necessary changes in their work to correct the condition without extra charge.

C. The Contractor shall furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

20. QUALIFICATIONS OF WORKERS

A. All mechanical work shall be accomplished by qualified workers competent in the area of work for which they are responsible. Untrained and incompetent workers, as evidenced by their workmanship, shall be summarily relieved of their responsibilities in areas of incompetency. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workman shall refrain from work in areas not satisfactory to them. Requests for relief of a workman shall be made through the normal channels of Architect, Contractor, etc.

B. All plumbing work shall be accomplished by Journeymen Plumbers under the direct supervision of a Master Plumber as defined and clarified under State Plumbing Law Regulations and Code. Proof and Certification may be requested by the Engineer.

C. All sheet metal, insulation and pipe fitting work shall be installed by workers normally engaged or employed in these respective trades, except where only small amounts of such work are required and are within the competency of workers directly employed by the Contractor involved.

D. All automatic control systems shall be installed by workers normally engaged or employed in this type work, except in the case of minor control requirements (residential type furnaces, packaged HVAC equipment with integral controls, etc.) in which case, if a competent workman is the employee of this Contractor, they may be utilized subject to review of their qualifications by the Engineer and after written approval from same.

E. All special systems (Automatic Sprinkler Equipment, etc.) shall be installed only by workers normally engaged in such services. Exception to this specification may only be made in writing by the Engineer.

F. All electrical work shall be installed only by competent workers under direct supervision of a fully qualified Electrician.

21. CONDUCT OF WORKERS

A. The Contractor shall be responsible for the conduct of all workers under their supervision. Misconduct on the part of any workman to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief of that workman. The consumption of alcoholic beverages or other intoxicants, narcotics, barbiturates, hallucinogens or debilitating drugs on the job site is strictly forbidden.

22. PROTECTION OF MATERIALS AND EQUIPMENT

A. The Contractor shall be entirely responsible for all material and equipment furnished by them in connection with their work and special care shall be taken to properly protect all parts thereof from physical, sun, and weather damage during the construction period. Such protection shall be by a means acceptable to the manufacturer and Engineer. All rough-in soil, waste, vent and storm piping, ductwork, etc., shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged, stolen or

vandalized while stored on site, either before or after installation, shall be repaired or replaced by the Contractor at their own expense.

23. SCAFFOLDING, RIGGING AND HOISTING

A. The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery onto the premises of any equipment and apparatus furnished. All such temporary appurtenances shall be set up in strict accord with OSHA Standards and Requirements. Remove same from premises when no longer required.

24. BROKEN LINES AND PROTECTION AGAINST FREEZING

A. No conduits, piping, troughs, etc. carrying water or any other fluid subject to freezing shall be installed in any part of the building where danger of freezing may exist without adequate protection being given by the Contractor whether or not insulation is specified or indicated on the particular piping. All damages resulting from broken and/or leaking lines shall be replaced or repaired at the Contractor's own expense. If in doubt, contact the Engineer. Do not install piping across or near openings to the outside whether they are carrying static or moving fluids or not. Special Note: Insulation on piping does not necessarily ensure that freezing will not occur.

25. CLEANING

A. The Contractor shall, at all times, keep the area of their work presentable to the public and clean of rubbish and debris caused by their operations; and at the completion of the work, shall remove all rubbish, debris, all of their tools, equipment, temporary work and surplus materials from and about the premises, and shall leave the area clean and ready for use. If the Contractor does not attend to such cleaning upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the Contractor. The Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of their rubbish or debris.

B. After completion of all work and before final acceptance of the work, the Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of piping, equipment, fixtures and all other associated or adjacent fabrication.

26. CONCRETE WORK

A. The Contractor shall be finally responsible for the provisions of all concrete work required for the installation of any of their systems or equipment. They may, at their option, arrange with the others to provide the work. This option, however, will not relieve the Contractor of their responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Mechanical work shall be 3000 psi minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication AC1-318. Heavy equipment shall

not be set on pads for at least seven (7) days after pour. Insert 6-inch steel dowel rods into floors to anchor pads.

B. All mechanical equipment (tanks, heaters, chillers, boilers, pumps, air handling units, etc.) shall be set on a minimum of 4" tall concrete pads. Pads shall be taller where required for condensate traps. All concrete pads shall be complete with all pipe sleeves, anchor bolts, reinforcing steel, concrete, etc. as required. Pads larger than 18" in width shall be reinforced with ½" round bars on 6" centers both ways. Bars shall be approximately 3" above the bottom of the pad. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms, all surfaces shall be rubbed to a smooth surface. Chamfer all square edges one-half inch.

C. In general, concrete pads for equipment shall extend four (4) inches beyond the equipment's base dimensions. Where necessary, extend pads 30 inches beyond base or overall dimensions to allow walking and servicing space.

D. Exterior concrete pads shall be four (4) inches minimum above grade and four (4) inches below grade on a tamped four (4) inch dense grade rock base unless otherwise indicated or specified. Surfaces of all foundations and bases shall have a smooth finish with one-half (1/2) inch chamfer on exposed edges.

E. All exterior below grade concrete structures (utility vaults, grease traps, manholes, etc.) shall be provided with exterior waterproofing. Waterproofing shall be hot-fluid applied rubberized-asphalt waterproofing membrane with elastomeric sheets at edges, corners, and terminations of membrane for continuous watertight construction. Apply in layers and reinforce as required to provide uniform seamless membrane minimum 4mm thickness. Also, seal penetrations into and out of the structure watertight. Provide Link-Seal modular seal or equal.

27. NOISE, VIBRATION OR OSCILLATION

A. All work shall operate under all conditions of load without any sound or vibration which is objectionable in the opinion of the Engineer. In case of moving machinery, sound or vibration noticeable outside of room in which it is installed, or annoyingly noticeable inside its own room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor at their expense.

B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports whether indicated or not suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc. by means of flexible connectors, vibration absorbers, or other approved means. Unitary equipment, such as small room heating units, small exhaust fans, etc., shall be rigidly braced and mounted to wall, floor or ceiling as required and tightly gasketed and sealed to mounting surface to prevent air leakage and to obtain quiet operation. Flush and surface

mounted equipment such as diffusers, grilles, etc., shall be gasketed and affixed tightly to their mounting surface.

C. The Contractor shall provide supports for all equipment furnished by them. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. If strength of supporting structural members is questionable, contact Engineers.

28. ACCESSIBILITY

A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in double partitions and hung ceilings for the proper installation of their work. They shall cooperate with all others whose work is in the same space. Such spaces and clearances shall, however, be kept to the minimum size required.

B. The Contractor shall locate and install all equipment so that it may be serviced, and maintained as recommended by the manufacturer. Allow ready access and removal of the entire unit and/or parts such as valves, filters, fan belts, motors, prime shafts, etc.

C. The Contractor shall provide access panels for each concealed valve, control damper or other device requiring service as shown on engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work.

29. RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, SURFACES, ETC.

A. The Contractor shall at their expense restore to their original conditions all paving, curbing, surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by their operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item and shall be to the satisfaction of the Architect and/or Engineer.

30. MAINTENANCE OF EXISTING UTILITIES AND LINES

A. The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that comes within the contract construction site, shall be subject to continuous uninterrupted service with no other exception than the Owner of the utilities permission to interrupt same temporarily.

B. Utilities and lines, where known, are indicated on the drawings. Locations and sizes are approximate. Prior to any excavation being performed, the Contractor shall ascertain that no utilities or lines are endangered by new excavation. Exercise extreme caution in all excavation work.

C. If utilities or lines occur in the earth within the construction site, the Contractor shall probe and locate the lines prior to machine excavation or blasting in the respective area. Electromagnetic utility locators and acoustic pipe locators shall be utilized to determine where metallic and non-metallic piping is buried prior to any excavation.

D. Cutting into existing utilities and services where required shall be done in coordination with and only at times designated by the Owner of the utility.

E. The Contractor shall repair to the satisfaction of the Engineer, any surfaces or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.

F. Machine excavation shall not be permitted with ten feet of electrical lines or lines carrying combustible and/or explosive materials. Hand excavate only.

G. Protect all new or existing lines from damage by traffic, etc. during construction. Repairs or replacement of such damage shall be at the sole expense of the party responsible.

31. SMOKE AND FIRE PROOFING

A. The Contractor shall fire and smoke stop all openings made in fire or smoke rated walls, chases, ceilings and floors in accord with the Building Code. Patch all openings around ductwork and piping with appropriate type material to stop smoke at smoke walls and provide commensurate fire rating at fire walls, floors, ceilings, roofs, etc. Back boxes in rated walls shall be a minimum distance apart as allowed by code to maintain the rating. If closer provide rated box or fireproofing in code approved manner.

32. MOTORS

A. Motors shall be built in accordance with the latest standards of NEMA and as specified. Motors shall be tested in accordance with standards of A.S.A. C50, conforming to this and all applicable standards for insulation resistance and dielectric strength.

B. Each motor shall be provided by the equipment supplier, installer or manufacturer with conduit terminal box, and N.E.C. required disconnecting means as specified or required. Three-phase motors shall be provided with external thermal overload protection in their starter units. Single-phase motors shall be provided with thermal overload protection, integral to their windings or external, in control unit. All motors shall be installed with NEMA-rated starters as specified and shall be connected per the National Electrical Code.

C. The capacity of each motor shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower. Motors producing excessive noise or vibration shall be replaced by the responsible contractor. See Division 26 of Specifications for further requirements related to installation of motors.

33. CUTTING AND PATCHING

A. The Contractor shall provide their own cutting and patching necessary to install their work. Patching shall match adjacent surfaces and shall be to the satisfaction of the Architect and Engineer.

B. No structural members shall be cut without the approval of the Engineer and all such cutting shall be done in a manner directed by them.

C. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

34. CURBS, PLATES, ESCUTCHEONS & AIR TIGHT PENETRATIONS

A. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4-inch-high by 3-inch-wide concrete curb.

B. Escutcheon plates shall be provided for all pipes and conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

C. Seal all duct, pipe, conduit, etc., penetrations through walls and floors air tight. If wall or floor assembly is rated then use similarly rated sealing method.

35. WEATHERPROOFING

A. Where any work pierces waterproofing including waterproof concrete, the method of installation shall be as approved by the Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings permanently watertight.

36. OPERATING INSTRUCTIONS, MAINTENANCE MANUALS AND PARTS LISTS

A. Upon completion of all work tests, the Contractor shall instruct the Owner or their representative(s) fully in the operations, adjustment and maintenance of all equipment furnished. The time and a list of representatives required to be present will be as directed by the Engineer. Turn over all special wrenches, keys, etc., to the owner at this time.

B. The Contractor shall furnish three (3) complete bound sets for delivery to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract prior to substantial completion. All instructions shall be

submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs alone will not be acceptable for operating and maintenance instructions.

C. The Contractor, in the instructions, shall include a preventive maintenance schedule for the principal items of equipment furnished under this contract and a detailed, parts list and the name and address of the nearest source of supply.

D. The Contractor shall frame under Lexan in the main mechanical room all temperature control diagrams and all piping diagrams.

37. PAINTING

A. In general, all finish painting shall be accomplished under the Painting Section of the specifications by the Contractor; however, unless otherwise specified under other sections of these specifications, the following items shall be painted:

(1) All exposed piping, valve bodies and fittings (bare and insulated), including hangers, platforms, etc.

(2) All mechanical equipment not factory finished. Aluminum and stainless-steel equipment, motors, identification plates, tags, etc. shall not be painted. All rust and foreign matter shall be thoroughly removed from surfaces prior to painting. All baked enamel factory finish of equipment which may have been scratched or chipped shall be touched up with the proper paint as recommended and supplied by the manufacturer.

(3) All ductwork exposed in finished areas (bare and insulated), all grilles, diffusers, etc. not factory finished. Paint the inside surfaces of all interior duct surfaces visible from any register, grille or diffuser opening on all jobs; surfaces shall receive one (1) prime coat of Rustoleum 1225 red "galvinoleum" or other approved equivalent primer and rust inhibitor and one (1) coat of Rustoleum 1579 jet black "Speedy Dry" enamel or approved equivalent applied in accordance with the manufacturer's recommendations.

(4) All insulated piping, ductwork and equipment shall be properly prepared for painting by the Contractor where mechanical items are to be painted. In the case of externally insulated duct and pipe, the Contractor shall provide 6 oz. canvas jacket with fire retardant lagging. The jacket shall be allowed to dry properly before applying paint to avoid shrinking after painting and exposing unpainted surfaces. The Contractor, at their option, may provide double wall ductwork in lieu of externally insulated ductwork with canvas jacket and lagging.

38. ELECTRICAL CONNECTIONS

A. The Contractor shall furnish and install all (1) temperature control wiring; (2) equipment control wiring and (3) interlock wiring. The Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power wiring thru starters, and shall furnish and install all required starters not factory mounted on equipment.

B. The Contractor shall, regardless of voltage, furnish and install all temperature control wiring and all associated interlock wiring, all equipment control wiring and conduit for the equipment that the Contractor furnishes. They may, at their option, employ at their own expense, the Electrical Contractor to accomplish this work.

C. After all circuits are energized and completed, the Contractor shall be responsible for all power wiring, and all control wiring shall be the responsibility of the Contractor. Motors and equipment shall be provided for current characteristics as shown on the drawings.

D. The Contractor shall furnish motor starters of the type and size required by the manufacturer for all equipment provided by them where such starters are necessary. Starters shall have overloads for each phase.

39. FINAL CONNECTIONS TO EQUIPMENT

A. The Contractor shall finally connect to mechanical services, any terminal equipment, appliances, etc., provided under this and other divisions of the work. Such connections shall be made in strict accord with current codes, safety regulations and the equipment manufacturer's recommendations. If in doubt, contact the Engineers prior to installation.

40. REQUIRED CLEARANCE FOR ELECTRICAL EQUIPMENT

A. The NEC has specific required clearances above, in front, and around electrical gear, panels etc. The Contractor shall not install any piping, ductwork, etc., in the required clearance. If any appurtenance is located in the NEC required clearance, it shall be relocated at no additional cost.

41. INDEMNIFICATION

A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

42. HAZARDOUS MATERIALS

A. The Contractor is hereby advised that it is possible that asbestos and/or other hazardous materials are or were present in this building(s). Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of their work, ensure that their workers are aware of this potential and what they are to do in the event of suspicion. They shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall ensure that no

one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.

B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.

C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise them immediately.

D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

43. ABOVE-CEILING AND FINAL PUNCH LISTS

A. The Contractor shall review each area and prepare a punch list for each of the subcontractors, as applicable, for at least two stages of the project:

(1) For review of above-ceiling work that will be concealed by tile or other materials well before substantial completion.
(2) For review of all other work as the project nears substantial completion.

B. When all work from the Contractor's punch list is complete at each of these stages and prior to completing ceiling installations (or at the final punch list stage), the Contractor shall request that the Engineer develop a punch list. This request is to be made in writing seven days prior to the proposed date. After all corrections have been made from the Engineer's punch list, the Contractor shall review and initial off on each item. This signed-off punch list shall be submitted to the Engineer. The Engineer shall return to the site once to review each punch list and all work prior to the ceilings being installed and at the final punch list review.

C. If additional visits are required by the Engineer to review work not completed by this review, the Engineer shall be reimbursed directly by the Contractor at a rate of $140.00 per hour for extra trips required to complete either of the above-ceiling or final punch lists.



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The following is CMTA's guide for Division 20-25 required information relative to the Schedule of Values. Please utilize all items that pertain to this project and add any specialized system as required. A thorough and detailed schedule of values will allow for fair and equitable Pay Application approval and minimize any discrepancies as to the status of the job. For projects with multiple areas, provide a unique schedule of values for each independent area.

DIVISION 20-25 – MECHANICAL **Field Representative: _____**
Project Engineer: _____

Description of Work	Scheduled Value	Labor	Material
Shop Drawings			
Mobilization/Permits			
Demolition			
Geothermal Horizontal Piping and Vault			
Geothermal Wells, Vertical pipe and grout			
Plumbing Underslab			
Sanitary Above Slab Rough-in			
Plumbing Fixtures			
Plumbing Inspections			
Sprinkler Plan Submittals			
Fire Protection Exterior			
Fire Protection Vault			
Fire Protection Interior			
Storm Piping Exterior			

Storm Piping Interior			
Plumbing Shop Drawings			
Mechanical Shop Drawings			
Domestic Water Piping			
Domestic Water Insulation			
Hydronic Piping			
Gas Piping Exterior			
Gas Piping Interior			
Steam Piping			
HVAC Sheet Metal			
Heat Pumps			
Boiler			
Chiller			
Cooling Tower			
Pumps & Assoc. Equipment			
Grilles & Diffusers			
Insulation			
Controls			
Air Balance			
Water Balance			
Chemical Treatment			
Boiler Inspection			
Factory Start-Up Reports			
Owner Training			
Record Drawings			
O & M Manuals			
Punchlist/Closeout			
Controls Check-out			

END OF SECTION 20 01 00

SECTION 20 02 00 - SCOPE OF THE MECHANICAL WORK

1. GENERAL

A. The Mechanical work for this Contract shall include all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, place in service and deliver to the Owner the complete mechanical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not necessarily limited to the following:

(1) Complete exterior domestic water service finally connected to the local domestic water system.

(2) Complete exterior sanitary sewer system connected to the local system.

(3) Complete exterior storm drainage system.

(4) Complete exterior fire protection system.

(5) Interior domestic hot, cold and recirculating hot water system.

(6) Interior soil, waste and vent systems.

(7) Roof drainage system.

(8) All plumbing equipment, fixtures and fittings.

(9) 100% automatic sprinkler system.

(10) All mechanical exhaust systems.

(11) All insulation associated with mechanical systems.

(12) Condensate drainage systems.

(13) Complete heating, ventilation and air conditioning systems.

(14) Final connection of all mechanical equipment furnished by others (e.g., kitchen equipment).

(15) Complete balancing of air and water systems.

(16) Complete natural gas piping systems.

(17) All applicable services and work specified in Section 200100; General Provisions - Mechanical.

(18) All specified or required control work.

(19) Provide all required motor starters, etc. not provided under the electrical sections.

(20) One year guarantee of all mechanical equipment, materials and workmanship.

(21) Thorough instruction of the owner's maintenance personnel in the operation and maintenance of all mechanical equipment.

(22) Thorough coordination of the installation of all piping, equipment and any other material with other trades to ensure that no conflict in installation.

(23) Approved supervision of the mechanical work.

(24) Excavation, backfilling, cutting, patching, sleeving, concrete work, etc., required to construct the mechanical systems.

(25) Prior to submitting a bid, the Contractor shall contact all serving utility companies to determine exactly what each utility company will provide and exactly what is required of the Contractor and shall include such requirements in their base bid.

(26) Procurement of all required permits and inspections, including fees for all permits and inspection services and submission of final certificates of inspection to the Engineers (Plumbing, Boiler, HVAC, etc.).

(27) All necessary coordination with gas, water, and sewer utility companies, etc., to ensure that work, connections, etc., that they are to provide is accomplished.

(28) Factory start-up of all major equipment (including terminal HVAC equipment) and submission of associated factory start-up reports to the Engineer.

END OF SECTION 20 02 00

SECTION 20 03 00 - SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS AND TOOLS

1. GENERAL

A. The Contractor's attention is directed also to the General and Special Conditions and Section 200100 - General Provisions - Mechanical as well as to all other Contract Documents as they may apply to their work.

B. The Contractor shall prepare and submit to the Engineer, through the General Contractor and the Architect (where applicable) within thirty (30) days after the date of the Contract, an electronic copy of all shop drawings, certified equipment drawings, installation, operating and maintenance instructions, samples, wiring diagrams, etc. on all items of equipment specified hereinafter.

C. Submittal data shall include specification data including metal gauges, finishes, accessories, etc. Also, the submittal data shall include certified performance data, wiring diagrams, dimensional data, and a spare parts list. Submittal data shall be reviewed by the Engineer before any equipment or materials is ordered or any work is begun in the area requiring the equipment.

D. All submittal data shall have the stamp of approval of the Contractor submitting the data as well as the General Contractor and the Architect (if applicable) to show that the drawings have been reviewed by the Contractor. Any drawings submitted without these stamps of approval may not be considered and will be returned for proper resubmission.

E. It shall be noted that review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.

F. The Engineers review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for: adaptability of the item to the project; compliance with applicable codes, rules, regulations and information that pertains to fabrication and installation; dimensions and quantities; electrical characteristics; and coordination of the work with all other trades involved in them.

G. project. Any items that differ from the Drawings or Specifications shall be flagged by the Contractor so the Engineer will be sure to see the item. Do not rely on the Engineer to “catch” items that do not comply with the Drawings or Specifications. The Contractor is responsible for meeting the Drawings and Specification requirements, regardless of whether or not something does not get caught by the Contractor or Engineer during shop drawing reviews.

H. Equipment shall not be ordered and no final rough-in connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractor. It shall be the Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. The Contractor shall coordinate with all the other trades having any connections, roughing-in, etc. to the equipment.

I. If the Contractor fails to comply with the requirements set forth above, the Engineer shall have the option of selecting any or all items listed in the Specifications or on the drawings; and the Contractor shall be required to furnish all materials in accordance with this list.

J. Colors for equipment in other than mechanical spaces shall be selected from the Manufacturer's standard and factory optional colors. Color samples shall be furnished with the shop drawing submission for such equipment.

K. Shop Drawing Submittals

(1) All submittals for HVAC equipment shall include all information specified. This shall include air and water pressure drops, RPM, noise data, face velocities, horsepower, voltage motor type, steel or aluminum construction, and all accessories clearly marked.

(2) All items listed in the schedules shall be submitted for review in a tabular form similar to the equipment schedule.

(3) All items submitted shall be designated with the same identifying tag as specified on each sheet.

(4) Any submittals received in an unorganized manner without options listed and with incomplete data will be returned for resubmittal.

2. SHOP DRAWINGS

Shop Drawings, descriptive literature, technical data and required schedules shall be submitted on the following:

Duct Insulation (Internal and External)
Air Units Handling Units
Pipe Insulation
Pumps
Water Heaters
Hydronic Specialties
Chemical Treatment System
Pumps and Circulators (HVAC)
Sheet Metal
Exhaust Fans
Unit Heaters
Louvers
Grilles, Registers, and Diffusers
Plumbing Fixtures
Grinder Pump
Ductless Split Systems
Piping Materials

SPECIAL NOTES:

1) Upon substantial completion of the project, the Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) an electronic copy of operation and maintenance instructions and parts lists for each item marked (1) above. These documents shall include at least:

    a. Detailed operating instructions
    b. Detailed maintenance instructions including preventive maintenance schedules.
    c. Addresses and phone numbers indicating where parts may be purchased.

2) Shop drawings for the Control Systems shall include detailed, scaled plans and schematic diagrams indicating the function and operation of the system.

3) Shop drawings for the Building Fire Protection System shall be prepared and stamped by a Certified Contractor and shall meet the criteria of the Department of Housing, Buildings and Construction and submitted to the Engineer. After the Engineer's review, they shall be submitted by the Contractor to the proper state authorities along with the required State review fee.

4) The Contractor shall submit to the Boiler Inspector's Office the required documentation and review fees for a boiler permit. The boiler permit shall be submitted to the Engineer along with the Boiler Shop Drawings.

5) The Contractor shall submit shop drawings for the kitchen hood system(s) along with all required supporting documentation and review fees to the Department of Housing, Buildings and Construction and receive approval prior to submittal to the Engineers.

6) The Contractor shall submit Material Safety Data sheets for all chemical treatment and anti-freeze solutions.

3. SPECIAL WRENCHES, TOOLS, ETC.

(1) The Contractor shall furnish, along with equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed under the Contract. Wrenches shall include necessary keys, handles and operators for valves, cocks, hydrants, etc. A reasonable number of each shall be furnished.

4. BALANCE REPORTS

A. Upon substantial completion of the project, the Contractor shall submit to the Engineers an electronic copy of the Certified Air and Hydronic Balance Report.

END OF SECTION 20 03 00

SECTION 20 04 00 - DEMOLITION AND SALVAGE

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

2. DEMOLITION

   A. INTENT

      It is the intent of this section to completely remove all components of any existing mechanical system no longer in use that will be open to view in, or will interfere with the operations of the completed building, or which will, in any way, interfere with project construction. Components of the existing mechanical systems which do not meet the above criteria, may be abandoned in place in a safe, workmanlike, code approved manner.

   B. PLUMBING

      (1) All existing piping not to be reused, shall be removed when located in accessible chases, accessible ceiling spaces, crawl spaces, mechanical rooms, exposed, etc.

      (2) Unless otherwise indicated, the Contractor shall be responsible for patching and repairing all holes, etc. in the ceilings, walls, and floors where plumbing piping is removed.

      (3) All lines abandoned in place shall be made safe in compliance with the State Plumbing Code.

   C. HVAC

      (1) Remove from the project area all piping not to be reused and hangers, specialties, etc. that are accessible or that become accessible during construction and/or interfere in any way with any part of the construction or would be exposed in the completed building.

      (2) Remove all temperature controls and related items that are accessible or become accessible during construction.

      (3) Remove all existing heating and ventilating equipment not indicated to be reused from the building.

      (4) The Contractor shall be responsible for the removal and/or relocation of any HVAC piping, equipment, fittings, valves, etc. which may, in the course of construction,

interfere with the installation of any new and/or relocated Architectural, Structural, Mechanical or Electrical Systems at no increase in the contract price.

(5) Unless otherwise indicated, the Contractor shall be responsible for the patching and repairing of all holes, etc. in the ceiling, wall and floors where HVAC equipment is removed.

(6) Unless otherwise noted, when removing equipment sitting on a concrete pad, also remove the concrete pad and patch and repair floor to match adjacent surfaces.

D. REFRIGERANT RECOVERY

(1) The Contractor shall have a licensed refrigerant recovery technician evacuate all refrigerants from all refrigeration equipment being removed in accordance with EPA guidelines and regulations. The Contractor shall take all necessary precautions to not accidentally vent refrigerants to the atmosphere. The recovered refrigerant shall be offered to the Owner. If the Owner refuses it then it becomes the property of the Contractor.

E. THERMOSTAT, THERMOMETER, AND MERCURY BEARING DEVICE DISPOSAL

(1) The Contractor shall dispose of all mercury bearing materials in accordance with state and federal guidelines. The Contractor shall take all necessary precautions to not accidentally allow mercury to be released from the device during demolition.

3. SALVAGE

A. It is the intent of this section to deliver to the owner all components of any mechanical system which may be economically reused by them. The Contractor shall make every effort to remove reusable components without damage and deliver them to a location designated by the Owner.

B. Components to be delivered to the owner shall be specifically identified by the owner's representative prior to beginning the demolition. These components shall include, but are not limited to the following:

(1) Control air compressor and air dryer.
(2) Hydronic pumps.
(3) Exhaust Fans.
(4) Fire Protection Hose Stations.
(5) Water Coolers.
(6) Unit Ventilators.

C. Other items become the property of the Contractor and are to be removed from the site.

END OF SECTION 20 04 00

SECTION 20 05 00 - COORDINATION AMONG TRADES, SYSTEMS INTERFACING AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

1. COORDINATION

   A. The Contractor is expressly directed to read the General Conditions and all detailed sections of these specifications for all other trades and to study all drawings applicable to their work, including Architectural and Structural drawings, to the end that complete coordination between trades will be affected. Special attention shall be given to the points where ducts or piping must cross other ducts or piping, where lighting fixtures must be recessed in ceilings, and where ducts, piping and conduit must fur into walls, soffits, columns, etc. It shall be the responsibility of the Contractor to leave the necessary room for other trades. No extra compensation will be allowed to cover the cost of removing piping, conduit, ducts, etc., or equipment found encroaching on space required by others.

   B. The Contractor shall be responsible for coordination with the Electrical trade to ensure that he has made provision for connections, operational switches, disconnect switches, fused disconnects, etc. for electrically operated equipment provided under this division of the specifications, or called for on the plans.

   C. If any discrepancies occur between accompanying drawings and these specifications and drawings and specifications covering other Contracts, each trade shall report such discrepancies to the Architect far enough in advance so that a workable solution can be presented. No extra payment will be allowed for relocation of piping, ductwork, conduit, and equipment not installed in accordance with the above instructions, and which interfered with work and equipment of other trades.

   D. In all areas where air diffusers and lighting fixtures are to be installed, the Contractor shall coordinate their respective construction and installations so as to provide combined symmetrical arrangements.

2. INTERFACING

   The Contractor shall ensure that coordination is affected relative to interfacing of systems. Some interface points are (but not necessarily all):

   A. Connection of Domestic Water System to water service mains.

   B. Connection of Fire Protection System to domestic water service.

   C. Connection of Sanitary sewer house line to municipal service.

   D. Connection of Storm Drainage System to municipal system.

   E. Connection of all controls to equipment.

F. Electrical power connections to electrically operated (or controlled) equipment.

3. CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

A. The Contractor shall make all connections to equipment furnished by others, or relocated from the existing structure, whenever such equipment is shown on any part of the drawings or mentioned in any part of the Specifications, unless otherwise specifically specified hereinafter.

B. Supervision to assure proper functioning and operation shall be provided by the Contractor.

C. Items indicated on the drawings as rough-in only (RIO) will be connected by others. The Contractor shall be responsible for rough-in provisions only.

D. For items furnished by others, relocated, or RIO, the Contractor shall obtain from the supplier or shall field determine as appropriate, the exact rough-in locations and connection sizes for the referenced equipment.

E. The Contractor shall be responsible for coordinating to determine any and all final connections they are to make to equipment furnished by others.

4. COORDINATION DRAWINGS AND RECORD DRAWINGS

A. COORDINATION as follows:

(1) Detailed electronic coordination drawings shall be required for this project and shall be led by the Mechanical Contractor. A specific line-item shall be included on the schedule of values by each Trade for “preparation of coordination drawings”. **This line-item value shall be approved by the Engineer. Minimum that shall be included is $20,000 for this effort.** The Engineer and the Engineer’s Field Inspector shall closely monitor progress and quality of the preparation of the electronic coordination drawings and may withhold pay requests as deemed appropriate.

(2) Coordination Drawings shall be provided on this project by each Trade (Mechanical, Fire Protection, Electrical). Drawings shall be 30 x 42 sheet size and shall be at ¼” scale and shall match the drawing setup as included in the Architectural Drawings. The Architect and Engineer will supply electronic drawings files of the Contract Documents upon the Contractor’s request and release.

(3) The basis for the Coordination Drawings shall be the sheet metal ductwork fabrication shop drawings and shall be prepared by the Mechanical Contractor. The Coordination Drawings shall indicate (1) systems above ceilings in finished areas, (2) systems supported from the structure in finished areas without ceilings, (3) systems in the mechanical rooms, and (4) all wall, roof, floor penetrations.

(4) The sheet metal fabrication shop drawings shall be completed in a timely manner

so as not to conflict with construction schedule and phasing plan. At the General Contractor's discretion, these drawings shall be completed in phases to correspond with the project construction work sequencing. The Mechanical Contractor shall furnish an electronic copy of these ductwork shop drawings to all other Trades, specifically the Fire Protection and Electrical and other Contractors as requested by the General Contractor for the purpose of including other trades work on the Coordination Drawings.

(5) It is realized that not all systems can be completely detailed. The coordination drawings shall include the following at a minimum:

a. All ductwork including and all above ceiling equipment i.e. VAV boxes indicating appropriate maintenance access routed as indicated on the drawings. The drawings shall indicate a 3 ft. clearance zone that is unobstructed and allows access from a 2x2 ceiling tile.
b. All hydronic, plumbing, and sprinkler piping. Indicate all valves and ensure that appropriate access is provided for all valves.
c. Provide all conduits (existing or new) 2" and above. Multiple smaller conduits hung on a common trapeze hanger that is larger than 6" wide
d. All cable tray and enclosed wireway shall be indicated and shall indicate all required access.
e. All wall, roof, floor penetrations.

(6) After completion of the Final Coordination Drawings, a Final Review with the all Trades shall occur to provide any final comments and approval by all Trades. Other interim coordination meeting will be required to ensure successful coordination drawings. Any additional coordination items will be updated by the Mechanical Contractor. The Final Approved Coordination Drawings shall distributed electronically (on CD) to each Trade by the Mechanical Contractor. The Mechanical Contractor shall also furnish a complete 30x42 paper set of drawings to the jobsite main office and shall utilize them for updates of field conditions/deviations that occur during construction. Final Approved Coordination Drawings shall also be distributed to the General Contractor, Owner, Architect and Engineer for their Records. This process shall be completed prior to starting any work.

(7) RECORD DRAWINGS - Each Contractor shall ensure that any deviations from the Coordination Drawings are recorded as they occur, in red erasable pencil on Coordination Drawings kept at the jobsite. Upon completion of a particular phase, the Mechanical Contractor shall incorporate all field deviations into the Coordination Drawings to be utilized as Record Drawings. The Engineer shall review the Record Documents from time to time to ensure compliance with this specification. Compliance shall be a contingency of final payment. Pay particular attention to the location of under floor sanitary and water lines, shut-off valves, cleanouts and other appurtenances important to the maintenance and operation of Mechanical Systems. Also, pay particular attention to Deviations in the Control Systems and all exterior utilities. Keep information in a set of drawings set aside at the job site especially for this purpose. The Record Drawings shall be distributed electronically (on CD) to the Construction Manager, Owner, Architect and Engineer for their Records.

END OF SECTION 20 05 00

SECTION 20 11 00 - SLEEVING, CUTTING, PATCHING AND REPAIRING

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. The Contractor shall be responsible for all openings, sleeves, trenches, etc., that they may require in floors, roofs, ceilings, walls, etc., and shall coordinate all such work with the General Contractor and all other trades. Coordinate with the General Contractor, any openings which they are to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the Contractor.

   C. The Contractor shall plan their work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for piping, ductwork, conduit, etc., to go through; however, when this is not done, the Contractor shall do all cutting and patching required for the installation of their work, or they shall pay other trades for doing this work when so directed by the Engineer. Any damage caused to the buildings by the workers of the responsible Contractor must be corrected or rectified by them at their own expense.

   D. The Contractor shall notify other trades in due time where they will require openings or chases in new concrete or masonry. They shall set all concrete inserts and sleeves for their work. Failing to do this, they shall cut openings for their work and patch same as required at their own expense.

   E. The Contractor shall be responsible for properly shoring, bracing, supporting, etc., any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements shall be promptly and properly made good to the satisfaction of the Engineer.

   F. All work improperly done or not done at all as required by the Mechanical Trades in this section, will be performed by the Contractor at the direction of the trade whose work is affected.

2. SLEEVES, PLATES AND ESCUTCHEONS

   A. The Contractor shall provide and locate all sleeves and inserts required for their work before the floors and surface being penetrated are built, otherwise the Contractor shall core drill for pipes where sleeves and inserts were not installed, or where incorrectly located. Core drilling is the only acceptable alternative to sleeves. Do not chisel openings. Where

sleeves are placed in exterior walls or in slabs on grade, the space between the pipe or conduit and the sleeves shall be made completely and permanently water tight.

B. Pipe that penetrates fire and/or smoke rated assemblies shall have sleeves installed as required by the manufacturer of the rating seal used.

C. At all other locations either pipe sleeves or core drilled openings are acceptable.

D. Where thermal expansion does not occur, the wall may be sealed tight to the pipe or insulation.

E. Insulation, that requires a vapor barrier (i.e., cold water or refrigerant piping, etc.), must be continuous through the sleeve/cored hole. For other piping, insulation may stop on either side of the sleeve.

F. Sleeves shall be constructed of 24-gauge galvanized sheet steel with lock seam joints or Schedule 40 pipe. Sleeves in floors shall extend 1" above finished floor level.

G. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster or other materials being forced into the space between pipe and sleeve during construction.

H. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4-inch-high by 3-inch-wide concrete curb.

I. Escutcheon plates shall be provided for all pipes and conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit. Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the pipe sleeves.

3. CUTTING

A. All rectangular or special shaped openings in plaster, stucco or similar materials, including gypsum board, shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirement is to provide smooth even termination of wall, floor and ceiling finishes as well as to provide a fastening means for grilles, diffusers, lighting fixtures, etc.

B. Mechanical, plumbing, and fire protection contractors shall coordinate all openings in new and existing masonry walls with the General Contractor; and, unless otherwise indicated on the Architectural drawings, provide lintels for all openings required for the work (Louvers, wall boxes, exhaust fans, etc.). Lintels shall be sized as follows:

(1) New Openings under 48" in width: Provide one 3-1/2"x3-1/2"x3/8" steel angle for each 4" of masonry width. Lintel shall have 8" bearing on either side.

(2) New Openings 48" to 96" in width: Provide one 3-1/2"x6"x3/8" steel angle for each 4" of masonry width. Lintel shall have 8" bearing on either side.

(3) New Openings over 96" in width: Consult the Project Structural Engineer.

C. No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Engineer.

D. Pipe openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.

E. Openings in metal building walls shall be made in strict accord with building suppliers recommendations.

4. PATCHING AND REPAIRING

A. Patching and repairing made necessary by work performed under this division shall be included as a part of the work and shall be done by skilled mechanics of the trade or trades for work cut or damaged, in strict accordance with the provisions herein before specified for work of like type to match adjacent surfaces and in a manner acceptable to the Engineer.

B. Where portions of existing lawns, shrubs, paving, etc. are disturbed for installation of work of this Division, such items shall be repaired and/or replaced to the satisfaction of the Engineer.

C. Where the installation of conduit, ducts, piping, etc. requires the penetration of fire or smoke rated walls, ceilings or floors, the space around such conduit, duct, pipe, etc., shall be tightly filled with an approved non-combustible fire insulating material satisfactory to maintain the rating integrity of the wall, floor or ceilings affected.

D. Where ducts penetrate fire rated assemblies, fire dampers shall be provided with an appropriate access door.

E. Piping passing through floors, ceilings and walls in finished areas, unless otherwise specified, shall be fitted with chrome plated brass escutcheons of sufficient outside diameter to amply cover the sleeved openings and an inside diameter to closely fit the pipe around which it is installed.

F. Stainless steel collars shall be provided around all ducts, large pipes, etc., at all wall penetrations; both sides.

G. Where ducts, pipes, and conduits pass through interior or exterior walls, the wall openings shall be sealed air tight. This shall include sealing on both sides of the wall to ensure air does not enter or exit the wall cavity. This is especially critical on exterior walls where the wall cavity may be vented to the exterior.

H. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

END OF SECTION 20 11 00

SECTION 20 12 00 - EXCAVATION, TRENCHING, BACKFILLING AND GRADING

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. The Contractor shall include all excavating, filling, grading, and related items required to complete his work as shown on the drawings and specified herein or as required to complete, connect and place all mechanical systems in satisfactory operation.

   C. Unless otherwise shown or required, provide separate trenches for sewers, water lines and other underground raceways, with a minimum of 10 feet measured from outside diameter between pipes. In locations, such as close to buildings where separate trenches for sewers and water lines are impractical, lay the water pipe on a solid shelf at least 2'-0" above the top of the sewer and 2-0" to the side. Electric and fuel lines shall always be placed in a separate trench. All exterior lines shall have a minimum earth cover of thirty (30) inches to top of pipe, unless otherwise indicated.

   D. Water lines crossing under sewer lines, or crossing less than 2 feet above sewer lines, must be encased for a distance not less than 5 feet on either side of the point of crossover.

2. SUBSURFACE DATA

   A. Materials to be excavated shall be unclassified, and shall include earth, rock, or any other material encountered in the excavating to the depth and extent indicated on the drawings and specified herein. No adjustment in the Contract sum will be made on account of the presence or absence of rock, shale, or other materials encountered in the excavating. This paragraph is written to include the removal of all rock with no extras, whether rock is indicated or not.

3. BENCHMARKS AND MONUMENTS

   A. Carefully maintain all benchmarks, monuments and other reference points. If disturbed or destroyed, replace as directed.

4. EXCAVATION

   A. Excavate trenches of sufficient width for proper installation of the work. When the depth of backfill over sewer pipe exceeds 10 feet, keep the trench at the level of the top of the pipe as narrow as practicable. Trench excavation for piping eight inches and smaller

shall not exceed thirty-inch width for exterior lines and twenty-four-inch width for interior lines.

B. Sheet and brace trenches as necessary to protect workmen and adjacent structures. Comply with local regulations or, in the absence thereof, with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America, Inc., and current OSHA Standards. Do not remove sheeting until trench is backfilled sufficiently to protect pipe and prevent injurious caving. Where removal of sheeting and/or bracing is hazardous, leave in place. Cut off such sheeting not to be removed at least 3 feet below finished grade.

C. Rules and regulations governing the respective utilities shall be observed in executing all work under this heading. Active utilities discovered in the course of excavation shall be protected or relocated in accordance with written instructions from the Engineer. Inactive and abandoned utilities encountered in trenching operations shall be removed and abandoned with ends plugged or capped in accord with current codes and safe practice. If in doubt, contact Engineers. Machine excavation shall not be allowed within ten (10) feet of existing electric lines or lines carrying combustible materials. Use only hand tools.

D. The removal of rock shall be accomplished by use of hand or power tools only. Blasting shall not be permitted unless authorized in writing by the Engineer. Any damage to existing structures, exterior services, or rock intended for bearing, shall be corrected at the Contractor's expense.

E. Perform final grading of trench bottoms by hand tools; carry machine excavation only to such depth that soil bearing for pipes and raceways will not be disturbed. Grade the bottom of trenches evenly to ensure uniform bearing for all piping and raceways. Cut bell holes as necessary for joints and jointmaking. Except as hereinafter specified, bottom of trenches for bell and spigot pipe, flanged pipe, etc. shall be shaped to the lower quadrant of pipe with additional excavation for bell or flange. Piping installed where it rests on bell, or flange and/or is supported with blocks or wedges will not be accepted.

F. Keep trenches free from water while construction therein is in progress. Under no circumstances lay pipe or appurtenances in water. Pump or bail water from bell holes to permit proper jointing of pipe. Any water pumping from this Contractor's trenches which is required during construction, shall be included in this Contract.

G. In no case shall excavation work be accomplished that will damage in any way the new structure, existing structures, equipment, utility lines, large trees to remain, etc. The Contractors shall take the necessary steps to prevent flow of eroded earth by water or landslide onto the property of others, or against the structures. The repair of all such damage or any other damage incurred in the course of excavation shall be borne by the responsible Contractor.

H. Use surveyor's level to establish elevations and grades.

I. The Contractor shall accept the site as he finds it and remove all trash, rubbish and material from the site prior to starting excavation of his work.

J. The Contractor shall provide and maintain barricades and temporary bridges around excavations as required for safety. Temporary bridges shall be provided where excavations cross paved areas and walks. The Contractor shall maintain these bridges in a safe and passable condition for all traffic until removal. Refer to OSHA Standards for such installations and comply with same in all details.

K. Pay particular attention to existing utilities and lines to avoid damage. The locations of existing lines which are indicated on the plans were taken unconfirmed from drawings prepared for previous construction and locations are approximate only. Also, certain water, gas, electric, storm and sanitary sewer lines and other underground appurtenances, active or abandoned, may not appear on the drawings. It shall be each Mechanical Contractor's responsibility to ascertain the location of all lines and excavate with caution in their area.

5. BACKFILL AND SURFACE REPAIR

A. Backfilling for mechanical work shall include all trenches, manhole pits, storage tank pits, and/or any other earth and/or rock openings which are excavated under this Contract. Backfilling shall be carefully performed and the surface restored to its original level to receive new finish. Wherever trenches and earth openings have not been properly filled and/or settlement occurs, they shall be re-excavated, re-filled and properly compacted, smoothed off and finally made to conform to the level of the original ground surface.

B. Unless otherwise indicated or specified, all piping shall be bedded on four (4) inches minimum of compacted naturally or artificially graded mixture of crushed gravel, crushed stone, or crushed sand with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve on undisturbed soil excavated as described hereinbefore. Install tracer wire above pipe. Cover the pipe with twelve (12) inches of compacted backfill to prevent settlement above and around the new pipe. The backfill shall be naturally or artificially graded mixture of crushed gravel, crushed stone, or crushed sand with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve. Prior to placing this second level of backfill, apply all required coatings and coverings to pipe, apply required tests and check the grading of the pipe to ensure that it is correct and that the pipe is free of swags, bows or bends. Also check lines for leaks at this point and repair as required. Once all of the preceding is accomplished, continue backfill with clean, debris and rock free earth tamped at six (6) inch intervals. Finish the backfill as specified following. Note: Water settling of backfill will be permitted only as an aid to mechanical compacting.

(1) When installing any type of pipe below building footing, parallel or perpendicular to the footing, the area underneath the footing and in the zone of influence shall be backfilled with cementitious flowable fill. The zone of influence is the area within a 45-degree angle projecting down from the bottom edge of footers on all sides of

the footing. Piping within flowable fill shall be isolated from the fill by a layer of heavy duty felt paper. Piping installed in trenches backfilled with flowable fill shall be anchored to the soil below prior to backfilling.

C. Backfill beneath areas to be seeded or sodded within six (6) inches of finished grade. The remaining six (6) inches shall be backfilled with clean top soil.

D. Backfill beneath paved areas, walks, etc. shall be brought to proper grade to receive the sub-base and paving. No paving shall be placed on uncompacted fill or unstable soil.

E. Backfill for lines carrying hazardous or combustible materials shall be in accordance with current codes, rules, regulations and safe practices. If in doubt, contact the Engineers.

F. Wherever, in the opinion of the Engineer, the soil at or below the requisite pipe grade is unsuitable for supporting piping, special support shall be provided as directed by the Engineer.

G. Unsuitable material and surplus excavated material not required for backfill shall be removed from the site. The location of dump and length of haul shall be the affected Contractor's responsibility.

H. Provide and place any additional fill material from off the site as may be required for backfill. Fill obtained from off site shall be of kind and quality as specified for backfill and the source approved by the Engineer and shall be brought to the site by the Contractor requiring the fill.

I. In the absence (if not specified or indicated elsewhere in the drawings or specifications to be done by others) of such work by others, the Contractor shall lay new sod over his excavation work. Level, compress and water in accord with sound sodding practice.

J. When running any type of piping below a footer or in the zone of influence the piping shall be backfilled with cementitious flowable fill. The zone of influence is the area under the footer within a 45-degree angle projecting down from the bottom edge of the footer on all sides of the footer. Additionally, grease traps, manholes, vaults, and other underground structures shall be held away from building walls far enough to be outside of the zone of influence.

K. Warning Tape and Tracer Wire

Provide a yellow and black plastic tape in all trenches 6" above the buried utility that identifies the utility about to be encountered. For non-metallic pipe a #12 copper wire shall also be laid in the trench to aid in future location of the piping. A foil faced warning tape may be used in lieu of the plastic tape and wire.

L. All manholes, vaults, and similar underground structures shall have the top elevation set flush with finished grade unless specifically noted otherwise.

6. MINIMUM DEPTHS OF BURY (TO TOP OF PIPE)

In the absence of other indication, the following shall be the minimum depth of bury of exterior utility lines. (Check drawings for variations).

A. Domestic Water Lines.....36 inches.

B. Fire Protection Lines.....42 inches.

C. Geothermal Lines.....42 inches.

D. Storm Lines.....20 inches.

E. Sanitary Lines (Exterior).....36 inches.

F. Natural Gas Lines.....36 inches.

G. Fuel Oil Lines.....36 inches.

H. Other lines carrying combustible and/or hazardous materials.....36 inches.

END OF SECTION 20 12 00

SECTION 20 13 00 - PIPE, PIPE FITTINGS AND PIPE SUPPORT

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

B. When a pipe size is not indicated, the Contractor shall request the pipe size from the Engineers. All piping shall be installed straight and true, parallel or perpendicular to the building construction. Piping shall be installed so as to allow for expansion without damage to the building finishes, structure, pipe, equipment, etc., use offsets, U-bends or expansion joints as required. Where a section of piping is not indicated but is obviously required for completion of the system, the Contractor shall provide same at no additional cost to the project. No mitered joints or field fabricated pipe bends shall be accepted. Pipe shall clear all windows, doors, louvers and other building openings.

C. All pipe shall be supported in a neat and workmanlike manner and wherever possible, parallel runs of horizontal piping shall be grouped together on trapeze type hangers. Vertical risers shall be supported at each floor line with approved steel pipe riser clamps. The use of wire or perforated metal to support pipes will not be permitted. Hanging pipes from other pipes shall not be permitted. Spacing of pipe supports shall not exceed eight feet for pipes up to 1-1/4 inches and ten feet on all other piping. Small vertical pipes (1 inch and less) shall be bracketed to walls, structural members, etc. at four (4) foot intervals so as to prevent vibration or damage by occupants. Insulated piping shall be supported on a rigid insulation block at each hanger so as to prevent crushing of insulation by hangers. Hangers shall pass completely around the insulation jacket and a steel protective saddle shall be applied to prevent compression of the insulation. (Refer to Specifications Section entitled INSULATION-MECHANICAL).

D. Where piping rests directly on a hanger, clip, bracket or other means of support, the support element shall be of the same material as the pipe, (e.g., copper to copper, ferrous to ferrous, etc.) or shall be electrically isolated one from the other so as to prevent pipe damage by electrolysis. Pay particular attention and do not allow copper pipe to rest on ferrous structural members, equipment, etc. without electrolytic isolation.

E. In general, piping shall be installed concealed except in Mechanical, Janitor Rooms, etc. unless otherwise indicated, and shall be installed underground or beneath concrete slabs only where indicated. All lines at ceilings shall be held as high as possible and shall run so as to avoid conflicts with other trades, and to facilitate the Owner's use and maintenance. Location of pipe in interior partitions shall be carefully coordinated with whoever will construct the partitions after the piping is in place. Where exposed risers occur, they shall be kept as close to walls as possible.

F. Installation of pipe shall be in such a manner as to provide complete drainage of the system toward the source. Drain valves shall be provided at all drainage points on pipes. Drain valves shall be 1/2" size gate type with 3/4" hose thread end and vacuum breaker. Label each drain valve.

G. All hot and cold-water piping shall be kept a sufficient distance apart so as to prevent heat transfer between them. Cold water piping shall also be kept apart from refrigerant hot gas lines.

H. Piping carrying water or other fluids subject to freezing shall not be installed in locations subject to freezing; if in doubt, consult Engineer.

I. Piping for all drainage systems shall be installed to permit flow, trapping, and venting in accord with current codes and sound practice.

J. All cast iron soil pipe and fittings shall be coated inside and out with coal tar varnish.

K. Non-metallic piping shall be installed in strict accordance with the manufacturer's instructions. If no such instructions are available, consult Engineers.

L. Nipples shall be of the same material, composition and weight classification as pipe with which installed.

M. Where piping is not indicated on the plans, but is obviously or apparently required, contact the Engineers prior to submission of a bid proposal.

N. Pay particular attention to conflict of piping with other work. Do not install until conflict is resolved. If necessary, contact Engineers.

O. Piping materials in each system shall, to the extent practicable, be of the same material. Frequent changes of material (for example, from copper to steel) shall be avoided and in no case, shall be accomplished without use of insulating unions and permission of the Engineers.

P. Apply approved pipe dope (for service intended) to <u>all</u> male threaded joints. Pay particular attention to dope for fuel gas lines. The dope shall be listed for such use.

Q. High points of closed loop hot water heating systems shall have manual or automatic air vents as indicated or required unless automatic air vents are specifically indicated. Pipe to suitable drainage point.

R. All piping shall be capped or plugged during erection as required to keep clean and debris and moisture free.

S. Provide expansion joints where shown on the plans and where required by good practice. Expansion joints shall be guided and anchored in accordance with the recommendations of the Expansion Joint Manufacturer's Association.

T. Where plastic pipe penetrates a fire rated assembly, it shall be replaced with a metal threaded adapter and a metal pipe per code.

U. Foam Core PVC is not permitted

V. Where piping penetrates interior or exterior walls, the wall shall be sealed air tight. Refer to the sleeving, cutting, patching and repairing section of the specifications for additional requirements.

W. Provide thrust blocks on all storm, sanitary, water, steam, hot, chilled, condenser, etc., and any other piping subject to hammering. Thrust blocks shall be provided at all turns.

X. All piping to hydronic coils shall be full size all the way to the coil connection on the unit. If control valve is smaller than pipe size indicated, transition immediately before and after control valve. Also, if coil connection at unit is a different size than the branch pipe size indicated, provide transition at coil connection to unit. On 3-way valve applications, the coil bypass pipe shall be full size.

Y. Provide check valves on individual hot and cold-water supplies to each mixing valve (including each sensor style faucet, safety shower, mop sink, etc.) and each showerhead with a diverter valve (including all ADA showers). This requirement shall not be satisfied by mixing valves or fixtures with internal check valves. Independent external check valves are required.

2. UNIONS AND FLANGES AND WELDED TEES

A. Screwed unions, soldered unions or bolted flanges shall be provided as required to permit removal of equipment, valves and piping accessories from the piping system. Keep adequate clearances for coil removal, rodding, tube replacement, motor lubrication, filter replacement, etc. Flanged joints shall be assembled with appropriate flanges, gaskets and bolting. Gaskets for steam piping systems shall be flexitalic spiral wound type. The clearance between flange faces shall be such that the connections can be gasketed and bolted tight without imposing undue strain on the piping system.

B. Dielectric insulating unions or couplings shall be used wherever the adjoining materials being connected are of dissimilar metals such as connections between copper and steel pipe.

C. Tee connections for welded pipe shall be made up with welding fittings. Where the size of the side outlet is such that a different connection technique than on the run is required, a weldolet, sockolet, or threadolet type fitting may be used for the branch in place of reducing tees only where the branch is 2/3 the run size or smaller.

3. SPECIFICATIONS STANDARDS

All piping and material shall be new and shall conform to the following minimum applicable standards:

A. Steel pipe; ASTM A-120, A-53 Grade A, A-53 Grade B.

B. Copper tube; Type K, L, M; ASTM B88-62; Type DWV ASTM B306-62.

C. Cast iron soil pipe; ASA A-40.l and CS 188-59.

D. Cast iron drainage fittings; ASA B16.12.

E. Cast iron screwed fittings; ASA B16.4.

F. Welding fittings; ASA B16.9.

G. Cast brass and wrought copper fittings; ASA B16.18.

H. Cast brass drainage fittings; ASA B16.23.

I. Reinforced concrete pipe; ASTM-C-76-64T.

J. Solder; Handy and Harmon, United Wire and Supply; Air Reduction Co. or equivalent.

K. CPVC Plastic pipe; ASTM D2846.

L. PVC plastic pipe; ASTM D1785.

M. ABS plastic pipe; ASTM D1788-73.

N. Cross-linked polyethylene (PEX) pipe; ASTM F876 and ASTM F877.

O. Cross-linked polyethylene (PEX) fittings; ASTM F1960

4. PITCH OF PIPING

All piping systems shall be installed so as to drain to a low point. Certain minimum pitches shall be required for this drainage. For proper flow and/or for proper operation, the following pitches shall be required:

A. Interior Soil, Waste and Vent Piping:

1/4 inch per foot in direction of flow where possible but in no case less than 1/8" per foot.

B. Exterior Sanitary Lines:

Not less than one (1) percent fall in direction of flow and no greater than indicated.

C. Roof Leaders:

1/8 inch per foot where possible.

D. Condensate Drain Lines from Cooling Equipment:

Not less than 1/4 inch per foot in direction of flow.

E. High and Low-Pressure Steam Mains:

One inch in 20 feet in direction of flow.

F. Steam Condensate Return Lines:

One inch in 20 feet in direction of flow.

G. Exterior Storm Lines:

Not less than 1 percent grade in direction of flow.

H. All Other Lines:

Provide ample pitch to a low point to allow 100 percent drainage of the system.

5. APPLICATIONS

A. General Notes

(1) Where plastic piping penetrates a fire rated assembly, it shall be replaced with a threaded metal adapter and metal pipe or whatever means necessary to maintain the separation rating in accordance with local plumbing and fire codes.

(2) Plastic piping or any materials with a flame and smoke spread rating not approved for plenum use shall not be permitted in supply, return, relief or exhaust plenums.

(3) PVC or plastic piping whether specifically listed or not may not be used in high rise buildings or anywhere else prohibited by code.

B. Sanitary Sewer – Exterior

(1) SDR 35 PVC pipe extruded from Type 1, Grade 1 polyvinyl chloride material. PVC pipe shall have a bell type fitting on one end. All joints shall be solvent cement type, made in accordance with the State Plumbing Code.

C. Storm Sewer – Exterior

(1) Class II reinforced concrete pipe (RCP) with tongue and groove gasketed joints conforming to ASTM C-443.

(2) SDR 35 PVC pipe extruded from Type 1, Grade 1 polyvinyl chloride material. PVC pipe shall have a bell type fitting on one end. All joints shall be solvent cement type.

D. Domestic Water Piping - Exterior

(1) Type "K" hard copper with wrought copper fittings and brazed joints.

(2) Schedule 150 ductile iron piping with cement mortar lining and rubber gasketed joints.

(3) Schedule 40 PVC pipe, NSF approved for underground domestic cold-water pipe, with solvent weld joints. All piping and joints shall meet the State Plumbing Code.

(4) Class 200 PVC. Piping shall meet AWWA C900 requirements, be UL listed, Factory Mutual approved and NSF approved. Joints shall have spigot pipe ends with a flexible elastomeric ring seated in a groove to provide water tight seal. Minimum burst pressure to be 900 psi when tested in accordance with ASTM D1599.

E. Fire Protection - Exterior and Interior

Refer to the Fire Protection System section of these specifications.

F. Soil Waste and Vent Piping - General Requirements

(1) Water closet floor flanges and ells shall be cast iron regardless whether PVC piping is allowed or not.

(2) Soil and waste piping serving mechanical rooms, laundries and kitchens shall be cast iron regardless whether PVC piping is allowed or not. Cast iron will also be required at any other location where waste water temperature can exceed 120°F. Cast iron shall extend a minimum of 35' past last waste inlet.

G. Soil, Waste and Vent Piping (Below Slab)

(1) Schedule 40 PVC pipe with drainage pattern fittings and solvent cement joints made in accordance with the State Plumbing Code. **Foam core piping is not permitted.**

(2) Service weight hubless cast iron with manufacturer's approved bands.

H. Soil, Waste and Vent Piping (Above Slab)

(1) Service weight hubless cast iron pipe. Bands shall be heavy duty band with extra width for lateral support. Each coupling shall include a minimum of four bands.

(2) Service weight cast iron hub and spigot piping with compression gasket joints.

(3) Type DWV copper drainage piping with cast bronze drainage pattern fittings with solder joints.

(4) Schedule 40 PVC pipe with drainage pattern fittings and solvent cement joints made in accordance with the State Plumbing code.

I. Sump Pump Discharge

(1) Type “M” copper with solder joints.

(2) Schedule 40 PVC where piping is not installed in a plenum. All piping exposed on the exterior must be copper.

J. Domestic Cold, Hot and Recirculating Hot Water Piping (Above and Below Slab)

(1) Cross-linked polyethylene (PEX) piping. Lead-free brass fitting and valves meant for potable water shall be used.

K. Trap Prime Piping

(1) Above slab: It shall match domestic water piping requirements.

(2) Underslab: It shall match domestic water piping requirements with a protective wrap or cross-linked polyethylene (PEX) piping.

L. Refrigerant Piping

Interior Piping for Variable Refrigerant Flow Systems 1/8” to 1-3/8” shall be ACR soft copper tube with long radius bends of soft copper tube. Provide ACR hard copper tube in all sizes for systems other than Variable Refrigerant Flow. Interior lines larger than 1-3/8” shall be ACR hard copper tube. All exterior lines shall be ACR hard copper tube. Fitting shall be wrought or forged copper with silver solder joints and minimum 15% silver content.

(1) General Installation Notes:

a. Contact Engineer 24 hours prior to installation of refrigerant lines or evacuation of refrigerant system.

b. Refrigerant lines installation must meet HVAC equipment manufacturer's recommendations.

c. While installing or soldering refrigerant lines, system must continuously be purged with nitrogen.

d. After system is installed, the refrigerant system must be evacuated to 25 microns for eight hours.

M. Condensate Drain Lines

(1) Type "DWV" copper, wrought copper, lead free solder.

(2) Schedule 40 PVC with solvent welded fittings.

N. Water Heater Relief Line

Type "M" copper tubing with sweat fittings and 95/5 solder.

END OF SECTION 20 13 00

SECTION 20 13 10 - WELDING

1. GENERAL

A. All welding accomplished by the Contractor shall comply with provision of the latest revision of applicable codes, whether ASME Boiler and Pressure Vessel Code for pressure piping or such State and Local requirements as may supersede these codes.

B. Welds shall be of sound metal thoroughly fused to the base metal at all points, free from cracks and reasonably free from oxidation blow holes and non-metallic inclusions. No fins or weld metal shall project within the pipe and should they occur, they shall be removed. All pipe beveling shall be done by machine. The surface of all parts to be welded shall be thoroughly cleaned free from paints, oil, rust or scale at the time of welding, except that a light coat of oil may be used to preserve the beveled surfaces from rust.

C. Pipe and fittings shall be carefully aligned with adjacent parts and this alignment must be preserved in a rigid manner during the process of welding.

D. Each Contractor shall be responsible for quality of welding done by their organization and shall repair or replace any work not done in accordance with specifications. If required by the Architect/Engineer, the Contractor shall cut out at least three (3) welds during the job for X-raying and testing. These welds shall be selected at random by the Resident Inspector and shall be tested as a part of the Contractor's Contract. Certifications of these tests and X-rays shall be submitted, in triplicate to the Engineer. In case a faulty weld is discovered, the Contractor shall be required to furnish additional tests.

2. WELDING QUALIFICATIONS

A. It is required that all welding of piping covered by this specification, regardless of conditions of service, be installed as follows:

(1) Pipe welding shall comply with the provisions of the latest revision of the applicable codes, whether ASME Boiler and Pressure Vessel Code, ASA Code for Pressure Piping, or such state or local requirements as may supercede codes mentioned above.

(2) Before any pipe welding is performed, submit to the Owner or their authorized representative, a copy of the welding procedure specifications, together with proof of its qualification as outlined and required by the most recent issue of the code having jurisdiction.

(3) Before any welder shall perform any pipe welding, submit to the Owner or their authorized agent the operator's qualification record in conformance with the provisions of the code having jurisdiction, showing that the operator was tested under the proven procedure specifications submitted.

(4) Standard Procedure Specifications and Welders qualified by the National Certified Pipe Welding Bureau shall be considered as conforming to the requirements of these specifications.

(5) “R” Stamp: Any welder performing modifications, repairs, etc. to boilers, pressure vessels, or other pressure retaining items shall have a current R stamp issued by the National Board of Boiler and Pressure Vessel Inspectors.

(6) “PP” Stamp: Any welder working with steam systems exceeding 15 PSIG shall have a current PP stamp issued by ASME. This shall apply up to the first stop valve for single boiler installations and up to the second stop valve for multiple boiler installations.

B. MATERIALS

(1) Welding fittings shall conform to ASA B16.9; of the same materials, thickness, etc., as the pipe being jointed; see ASA B36.10.

END OF SECTION 20 13 10

SECTION 20 21 00 - VALVES AND COCKS

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

   B. The Contractor shall provide all valves required to control, maintain and direct flow of all fluid systems indicated or specified. This shall include, but may not be limited to all valves of all types including balancing cocks, air cocks, lubricated plug cocks, packed plug cocks, special valves for special systems, etc., for all Mechanical Systems.

   C. All valves shall be designed and rated for the service to which they are applied.

   D. The following type valves shall not be acceptable: Zinc, plastic, fiber or non-metallic.

   E. Ball valves with temperature and pressure ports are not an acceptable alternative to the balancing valves specified herein. Valves that do not comply with these specifications shall be removed and replaced by the Contractor with no increase in contract price.

   F. Each type of valve shall be of one manufacturer, i.e., gate valves, one manufacturer, globe valves, one manufacturer, silent check valves, one manufacturer, etc. The following valve manufacturers shall be acceptable: Lunkenheimer, Tour & Anderssen, Powell, Nibco, Crane, Jenkins, T & S Brass, Walworth, Milwaukee, DeZurik, Consolidated Valve Industries, Inc., Victaulic, Bell & Gossett, Flow Design, Watts, Victaulic.

   G. All valves shall comply with current Federal, State and Local Codes.

   H. All valves shall be new and of first quality.

   I. All valves shall be full line size. Valves and hydronic specialties shall not be reduced to coil or equipment connection size. Size reductions shall be made at the connection to the equipment.

   J. Angle stops for plumbing fixtures shall be quarter turn ball type.

   K. All valves for use in potable water systems shall comply with federal lead-free requirements that the lead content of wetted surfaces cannot exceed 0.25% by weight.

2. LOCATION OF MAINTENANCE VALVES

   Maintenance valves and unions, installed so as to isolate equipment from the system shall be installed at the following locations:

A. At each plumbing fixture.

B. At each air handling unit, and make–up air unit.

C. At each unit heater.

D. At each heating or cooling coil.

E. At all other locations indicated on the drawings.

3. WORKMANSHIP AND DESIGN

A. Handwheels for valves shall be of a suitable diameter to allow tight closure by hand with the application of reasonable force without additional leverage and without damage to stem, seat and disc. Seating surfaces shall be machined and finished to ensure tightness against leakage for service specified and shall seat freely. All screwed valves shall be so designed that when the screwed connection is properly made, no interference with, nor damage to the working parts of the valve shall occur. The same shall be true for sweat valves when solder or brazing is applied.

4. TYPES AND APPLICATION

A. GATE VALVES

Gate Valves shall be of the wedge disc type, permit straight line flow, complete shut-off and designed so that when the valve is wide open, it can be packed under pressure. Valves 1-1/2 inches and smaller shall be bronze, with ends to suit piping and non-rising stem. The valve shall have a deep stuffing box for long contact with the stem, packing gland and filled with high quality packing. Valves 2 inches thru 4 inches shall be iron body bronze mounted with flanged ends and non-rising stem. Boiler stop valves and valves larger than 4 inches shall be iron body bronze mounted flanged ends with outside screw and yoke with rising stem. Working pressure for bronze valves shall be 150 pounds and iron valves 125 pounds when installed in piping with system pressures up to 100 pounds per square inch and 250 pounds for 100 pounds per square inch and over. 2" and under NIBCO T133, greater than 2" NIBCO F619. All gate valves 2” and smaller for use in potable water systems shall meet federal requirement to be lead free containing less than 0.25% lead by weight of wetted area. NIBCO F768B.

B. GLOBE VALVES

Globe Valves shall permit control of flow rate from full flow to complete shut-off and designed that when the valve is wide open it can be repacked under pressure, and have a deep stuffing box with gland and filled with high quality packing. Valves 1-1/2 inches and smaller shall be bronze with ends to suit piping union bonnet, and with stainless steel plug type disc and seat of not less than 500 Brinnell hardness. Valves 2 inches and larger shall be iron body bronze mounted with flanged ends, yoke bonnet, and disc guide. Working

pressure for bronze valves shall be 150 pounds and iron valves 125 pounds when installed in piping with system pressures up to 100 pounds per square inch and 250 pounds for 100 pounds per square inch and over. 1-1/2" and under NIBCO T256AP, greater than 1-1/2" NIBCO F768B.

C. CHECK VALVES

Check Valves shall be horizontal swing type with two-piece hinges, disc construction seats to be bronze and bronze discs or with composition face depending on service and provide silent operation. Valves 1-1/2 inches and smaller shall be bronze with ends to suit piping, have full area "Y" pattern body and integral seats. Valves 2 inches and larger shall be iron body brass mounted and with flanged ends. Working pressure for bronze valves shall be 150 psi and iron valves 125 psi when installed in piping with system pressures up to 100 psi and 250 psi for 100 psi and over. 3" and under NIBCO T433Y, greater than 3" NIBCO F918B (for less than 100 psi systems) greater than 3” NIBCO F968B (for 100 psi or greater systems). Victaulic 716/779 check valves allowed with grooved piping system.

D. BALL VALVES (NON-POTABLE)

Ball Valves shall have removable lever handle with vinyl grip, adjustable stem gland screw, reinforced Teflon stuffing box ring, blow out proof stem, bronze body, reinforced Teflon seats, chrome plated steel ball as manufactured by Consolidated Valve Industries, Inc., Lunkenheimer, Apollo, Jenkins, Nibco or equivalent. Provide a stem extension so that the base of the handle is 1/4" above the insulation similar to Nibseal. NIBCO T5800-70.

E. BALL VALVES (POTABLE WATER)

All valves for use in potable water systems 2” and smaller contain less than 0.25% lead by weight and comply with federal lead free potable water requirements. Ball valves shall have a removable lever handle with vinyl grip, adjustable stem gland screw, reinforced Teflon stuffing box ring, blowout proof stem, stainless steel or bronze body, reinforced Teflon seats, stainless steel or chrome plate steel ball as manufactured by Apollo, Aslo, Nibco, Milwaukee, or equivalent. Provide a stem extension so that they bas of the handle is ¼” above the insulation similar to Nibseal. NIBCO S-585-66-LF.

F. BUTTERFLY VALVES

Butterfly valves shall be line sized cast iron body, lug style, 200 PSI rating (bubble tight) EPT or Viton seat, cartridge type; high strength stem. Disc to have ground and polished seating surface. Operator shall be locking lever style. Quality equivalent to Crane Monarch series. 3" and under NIBCO LD3222-3, greater than 3" NIBCO LD3022-5. Valves 6” and over shall have gear driven operators. 3” and under Victaulic 608N, greater than 3” Vic-300 butterfly valves allowed with grooved piping system.

G. BALANCING VALVES

Bell & Gossett, Model CB circuit setter balancing valve or approved equivalent. For

domestic water ½" and ¾" valves, Model RF reduced flow balancing valve shall be provided. Calibrated balancing valve shall have flanged connections suitable for 125# working pressure at 250°F. 4" and up shall be rated at 175# at 250°F working pressure. Provide with brass readout valves fitted with an integral EPT insert and check valve. Each balance valve shall have a calibrated nameplate to assure specific valve settings and be constructed with internal seals to prevent leakage. **Note: Refer to Specification Section 230200-HVAC Equipment for automatic flow control balancing valves on terminal equipment.**

H. AIR COCKS

Straight nose; Lunkenheimer Fig. 476; bronze; tee handle; bent nose; Lunkenheimer Fig. 478, 125#; bronze; tee handle.

I. GAUGE COCKS

Straight, Lunkenheimer, Fig. 1178; 125#; bronze; tee handle. FIP.

J. LUBRICATED PLUG COCKS

2" and under; Homestead Fig. 601; 150#; semi-steel; screwed; 2-1/2" and over; Homestead Fig. 602; ±50#; semi-steel; flanged.

K. PACKED PLUG COCKS

2" and under; DeZurik Fig. 425-S; 175#; semi-steel; screwed. 2-1/2" and over; DeZurik Fig. 425-F; 175#; semi-steel; flanged.

END OF SECTION 20 21 00

SECTION 20 21 10 - ACCESS TO VALVES, EQUIPMENT, FILTERS, ETC.

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Requirements-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

   B. All mechanical equipment shall be installed in a manner which allows ready access to all components requiring service, adjustments, shutoff, etc.

   C. Filters shall be accessible, removable and replaceable without disconnecting mounting brackets, piping, wiring, etc.

   D. All oil cups, grease cups, grease fittings, etc. shall be accessible without disassembly of equipment, piping, ductwork, etc. (Extended oilers or grease fittings may be required).

   E. Provide access doors or panels for all equipment, valves, dampers, filters, fire dampers, etc. in concealed spaces not otherwise provided with suitable access. (Lay-in ceilings shall be considered acceptable access; splined or drywall ceilings shall not).

   F. All valves, unions, strainers, cleanouts, volume dampers, and test points shall be accessible.

   G. Access panels in lay-in ceilings shall be labeled with a lamacoid plate to indicate location of equipment, filters, valves, etc.

   H. Access panels in fire rated walls shall bear the same rating as the wall.

   I. Each fire damper shall be provided access through the duct to allow reset of the damper. This may be either a gasketed sheet metal panel over a suitable opening or a factory built access panel. The panel shall be at least one and one-half (12) inch larger than the opening all around and shall be held in place with sheet metal screws sufficiently to ensure that it is air tight. Manually check the size and location of each of these openings to ensure that the fire damper may be manually reset by use of hand only.

   J. Contractor shall coordinate the finish of all access doors and panels installed in finished areas with Architect.

2. ACCESS DOORS

   Refer to Sheet Metal and Flexible Duct section of the specifications.

END OF SECTION 20 21 10

SECTION 20 22 00 - INSULATION - MECHANICAL

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

   B. Work under this section shall include all labor, equipment, accessories, materials and services required to furnish and install all insulation, fittings and finishes for all mechanical systems specified herein and/or as indicated.

   C. Application of insulation materials shall be done in accordance with manufacturer's written recommendations. Where thickness of insulation is not specified, use applicable thickness recommended by manufacturer for specific use. Insulation shall be applied by a company regularly engaged in the application of insulation and any work deemed unacceptable by the Engineers shall be removed and properly installed at the expense of the Contractor.

2. MANUFACTURERS

   A. Insulation shall be as manufactured by Manville, Knauf, CertainTeed, Owens-Corning, Armacell or approved equivalent. Insulation sundries, adhesives, and jackets/covers shall be as made by Benjamin Foster, Zeston, Speedline, Proto, Childers, Vimasco or approved equivalent.

3. FIRE RATINGS AND STANDARDS

   A. Insulations, jackets and facings shall have composite fire and smoke hazard ratings as tested by ASTM E-84, NFPA 255 and UL 723 procedures not exceeding Flame Spread 25, Smoke Developed 50.

   B. Adhesives, mastics, tapes and fitting materials shall have component ratings as listed above.

   C. All products and their packaging shall bear a label indicating above requirements are not exceeded.

   D. Duct linings shall meet the Erosion Test Method in compliance with UL Publication No. 181.

4. GENERAL APPLICATION REQUIREMENTS

   A. Insulation shall be applied on clean, dry surfaces in a neat and workmanlike manner reflecting the best current practices in the trade. Insulation shall not be applied to piping, ductwork or equipment until tested, inspected and released for insulation.

   B. All insulation shall be continuous through walls, ceiling openings and sleeves. However, insulation shall be broken through fire walls. All covered pipe and ductwork is to be located

a sufficient distance from walls, other pipe, ductwork and other obstacles to permit the application of the full thickness of insulation specified. If necessary, extra fittings and pipe are to be used. No noticeable deformation of insulation or discontinuity of vapor seal, where required, will be accepted.

C. "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, mechanical platform, mezzanine, penthouses, storage areas, unfinished rooms, etc. is to be considered as "exposed".

D. Existing and/or new insulation removed and/or damaged during course of construction shall be repaired or replaced as directed by the Engineer.

E. Vapor barrier jackets shall be applied with a continuous unbroken vapor seal. Do not use staples thru the jacket. NO EXCEPTIONS!

F. All insulation shall be installed with joints butted firmly together.

G. The Contractor shall ensure that all insulation (piping, ductwork, equipment, etc.) is completely continuous along all conduits, equipment, connection routes, etc. carrying cold fluids (air, water, other) and that condensation can, in no way, collect in or on the insulation, equipment, conduits, etc. Any such occurrence of condensation collection and/or damage therefrom shall be repaired solely at the expense of the Contractor.

5. PIPING SYSTEMS

A. GENERAL

(1) Bevel insulation and jacket at all points where insulation terminates at unions, flanges, valves and equipment. Note: Applies to hot water lines only; cold water lines require continuous insulation.

(2) Pipe insulation shall extend around valve bodies to above drain pans in hydronic equipment over pumps, etc. to ensure no condensation drip or collection.

(3) Factory molded fittings may be installed in lieu of built-up fittings. Jackets to be the same as adjoining insulation. Insulated fittings must have same or better K factors than adjoining straight run insulation.

(4) Valves, flanges and unions shall only be insulated when installed on piping whose surface temperature will be at or below the dew point temperature of the ambient air.

(5) Insulation shall not extend through fire and smoke walls. A UL-listed penetration system shall be used for each fire or smoke wall penetration in accordance with KBC. Materials used such as caulk, sleeves, etc. shall be manufactured by 3M, Hilti, or equal.

B. INSULATION SHIELDS

(1) Metal insulation shields are required at all pipe hangers where the piping is insulated. Metal shields shall be constructed of galvanized steel, formed to a 180-degree arc. Insulation shields shall be the following size:

PIPE SIZE	SHIELD GAUGE	SHIELD LENGTH
2" AND LESS	20	12"
2 1/2" TO 4"	18	12"
5" TO 10"	16	18"
12" AND GREATER	14	24"

C. INSULATION MATERIAL (FOR THE FOLLOWING SYSTEMS)

Insulation shall be Owens-Corning Model 25ASJ/SSL, or approved equivalent fiberglass pipe insulation with an all service jacket. The insulation shall be a heavy density, pipe insulation with a K factor .23 at 75°F mean temperature. The insulation shall be wrapped with a vapor barrier jacket. Approved manufacturers are listed in Section 2 – Manufacturers. The jacket shall have an inside foil surface with self sealing lap and a water vapor permeability of .02 perm/inch. All circumferential joints shall be vapor sealed with butt strips. All insulation shall be installed in strict accordance with the manufacturers' recommendations. The following pipes shall be insulated with the thickness of insulation as noted.

(1) Domestic Cold Water, including trap primer piping above slab

a. Piping 3'' or less – use 1/2" thick insulation. Provide an additional ½" layer of insulation 3" above and 3" below vertical pipe supports.

b. Piping 4'' or greater – use 1'' thick insulation.

(2) Domestic 110°F Hot Water and 110°F Recirculating Hot Water.

a. Piping 1 ½'' or less – use 1 ½'' thick insulation.

b. Piping 2'' or greater – use 2'' thick insulation.

(3) Domestic 140°F Hot Water and 140°F Recirculating Hot Water.

a. Piping 1 ½'' or less – use 1 ½'' thick insulation.

b. Piping 2'' or greater – use 2'' thick insulation.

(4) Domestic Hot Water with Heat Tape for Heat Maintenance - Insulation thicknesses as required by the manufacturer to maintain water temperature.

(5) Sanitary Sewer and plumbing fixture P-traps to waste stack – see schedule below. Insulate horizontal runs which receive air conditioning condensate and which are not located below slab or grade.

a. Piping 3'' or less – use 1/2" thick insulation

b. Piping 4'' or greater – use 1'' thick insulation

(6) Condensate Drain Lines.

a. Piping 1 ½'' or less – use 1/2" thick insulation

b. Piping 2'' or greater – use 1'' thick insulation

(7) Refrigerant Liquid and Suction Lines - Interior & Exterior

IMCOA, Nomaco, or Armacell closed cell polyethylene, 1.5 Lbs/Ft^3 density, 0.24 BTU-Hr.-Ft^3-°F/in at 75°F thermal conductivity, zero vapor permeance, 25/50 flame and smoke spread per NFPA 90 requirements. Elastomeric closed cell insulations that meet the above requirements are also allowed. Install insulation per the manufacturer's requirements. Provide UV protective coating for all exterior refrigerant lines.

a. All pipe sizes: 1 ½'' thick

D. JACKETS

(1) Exposed (Mechanical Rooms, Interior Finished Rooms and Storage Rooms)

All insulated piping installed in the above areas shall have a canvas or PVC jacket:

a. 6 oz. canvas jacket with fire retardant lagging. Apply to the insulation specified for the piping.

b. For all systems except steam, plenum rated PVC jacket equal to LoSmoke PVC jacket with flame/smoke rating of 25/50, ASTM-E84 test method. Minimum thickness 0.04 inches. Steam systems shall utilize plenum rated CPVC jacket with minimum thickness of 0.04 inches. Jackets shall be applied over top of specified pipe insulation. Approved equal manufacturers are Zeston and Speedline. Approved equal manufacturers are Zeston and Speedline.

(2) Exposed (Exterior)

In addition to the insulation specified for the exterior pipe, provide .016" aluminum jacket or PVC jacket 0.05" thick. The jackets shall be installed as recommended by the manufacturer to maintain water tight seal. All longitudinal and transverse seams to be sealed water tight. PVC jacket shall be Ceel-Co, Proto, or Zeston.

6. DUCTWORK SYSTEMS

A. GENERAL

(1) Duct sizes indicated are the net free area inside clear dimensions; where ducts are internally lined, overall dimensions shall be increased accordingly.

(2) Duct insulation shall extend completely to all registers, grilles, diffusers, and louver outlets, etc., to ensure no condensation drip or collection. The backs of all supply diffusers, plenums, grilles, etc. shall be insulated only if indicated by details on the drawings.

(3) Insulate the ends of slot diffuser plenum boxes.

(4) All flexible duct connections on insulated ductwork shall be externally insulated.

(5) All duct outside of building envelope, including rooftop duct, duct in unconditioned attic spaces above the insulation, etc. shall have two layers of specified insulation. This shall apply to supply air, exhaust air where air is run through energy recovery unit, outside air, return air, and combustion air intake ducts.

B. EXTERNAL INSULATION

(1) Supply Air
(2) Return Air
(3) Outside Air
(4) Exhaust Air
(5) Ducts from the exterior of the building to the backdraft or motorized damper
(6) Flexible Duct Connections on Internally Lined Ducts

Owens/Corning “Faced Duct Wrap - Type 100", or approved equal, 2" thick fiberglass duct wrap, 1.0 pcf density factory laminated to a reinforced foil kraft vapor barrier facing (FRK) with a 2" stapling flange at one edge. Flame spread 24, smoke developed 50, vapor barrier performance 0.02 perms per inch. K factor shall not exceed .26 at 75°F. mean temperature. Minimum R-value of the 2” thick insulation shall be 7.4 out of package and 6.0 installed.

Special Notes:

a. Do not provide externally insulated duct per the above specification for any duct that is to be painted. Insulated duct that is to be painted shall be dual wall ductwork per specification Section 231200, Sheet Metal and Flexible Duct.
b. Where supply, return, and outside air ductwork is routed through an unconditioned attic or any other space outside of the building thermal envelope, the ductwork shall be provided with a minimum of 2 layers of duct wrap for a minimum R value of 11.0. Additionally, this shall apply to exhaust ductwork on entering side of energy recovery type air handling units.

C. EXPOSED EXTERNALLY INSULATED DUCT

(1) Round. 1 ½'' semi-rigid fiberglass tank and pipe wrap with kraft aluminum foil all service jacket vapor barrier or PSK facing. K=.27 @ 75°F. Minimum R-value shall be OK. Provide 6 oz. canvas jacket with fire retardant lagging.

(2) Rectangular. 1" rigid fiberglass industrial board with foil scrim kraft vapor barrier facing or PSK facing, 6.0 PCF density, K=.22 @ 75°F. Owens/Corning type 705. Provide 6 oz. canvas jacket with fire retardant lagging.

D. EXTERNALLY INSULATED DUCT – OUTDOORS

(1) 2" semi-rigid fiberglass industrial board with foil scrim kraft vapor barrier facing or PSK Facing, 3.0 PCF density, K=.23 @ 75°F. Minimum R-value of 8.7. Owens/Corning, or approved equivalent industrial installation type 703. Weather proofing shall be ductmastic adhesive and sealer rated for outdoor use, Hardcast Flex-Grip 550, or approved equivalent.

(2) As an alternative to duct mastic adhesive and sealer, Contractor may provide a field applied aluminum jacket meeting the following specification:

Aluminum Jacket Material: Smooth finished sheets manufactured from 0.024-inch-thick aluminum alloy complying with ASTM B209 and having an integrally bonded 10mil thick, heat-bonded polyethylene and kraft paper moisture barrier over entire surface in contact with insulation.

Aluminum Jacket Applications: Apply aluminum jacketing to all external ductwork that is externally insulated. Cover all fittings and specialties with aluminum jacketing. Provide a 2-inch overlap at longitudinal seams and end joints. Secure jacket with stainless-steel sheet metal screws 6 inches o.c. and at end joints. Overlap longitudinal seams arranged to shed water and seal end joints with weatherproof mastic.

7. MECHANICAL EQUIPMENT

A. FLOOR DRAIN SUMPS (Applies to all Floor Drains which Receive Air Conditioning Condensate and which are Installed in Locations Other Than Slab on Grade)

(1) Owens-Corning Model 475-FR or approved equivalent rigid board insulation with exterior vapor barrier jacket formed to bottom of sump basin. Insulation shall have a K factor of .22 at 75°F. mean temperature. Insulation shall be 1" thick. Insulation shall be formed to roof drain sump. Vapor barrier shall remain continuous.

B. EXPANSION TANK, COMPRESSION TANK, AIR SEPARATOR, HEAT EXCHANGER, SIDESTREAM/LOOP FILTERS, AND HOT WATER STORAGE TANKS

(1) Owens-Corning "Tank Wrap I" or approved equivalent. Insulation shall be constructed of non-combustible, flexible wool. Insulation shall be 2" thick. K factor shall be .29 at 100°F. mean temperature. Insulation shall be attached in strict accordance with the manufacturer's recommendations. All insulation shall be jacketed with 6 oz. canvas with fire retardant lagging. Coordinate with mechanical contractor to extend all piping

connections, blowdown ports, etc. outside of the insulation. Additionally, for loop filters and other equipment requiring periodic service, provide removable insulated covers.

END OF SECTION 20 22 00

SECTION 20 23 00 - THERMOMETERS AND OTHERS, MONITORING INSTRUMENTS

1. GENERAL

   A. The Contractor shall include all thermometers, pressure gauges and/or compound gauges at the locations indicated.

2. THERMOMETERS AND PRESSURE GAUGES

   A. All thermometers and gauges shall be readable from a standing position on the floor. Position all gauges accordingly.

   B. The range for all gauges shall be selected such that the expected operating pressure or temperature , etc of each gauge will fall at the 12-o-clock position. Gauges with ranges that do not match the operating range of the system are to be replaced at the contractor's expense.

   C. Thermometers shall be linear, alcohol filled, graduated in 1°F. Or less and shall have adequate range for service intended.

   D. Pressure gauges shall be Bourdon Type, circular, 3" face, black letters on white face graduated in 2 PSI or less and shall have adequate range and shall be manufactured for service intended. Provide with pig tail connectors and gauge cocks.

   E. Pressure gauges and thermometers subject to vibration shall be mounted remotely away from vibrating pipe surface, etc., with flexible tubing.

   F. Mount thermometers in approved wells and install with thermal grease. Do not make direct contact of base with fluid in pipe.

   G. Gauges and thermometers shall be Marsh, Marshalltown, Weksler or equivalent.

3. Provide, when indicated on the plans, on the inlet and outlet of each terminal unit, a "Pete's Plug" or equivalent pressure/temperature test station. Furnish two (2) matching thermometers and pressure gauges to the owner upon project completion.

END OF SECTION 20 23 00

SECTION 20 24 00 – IDENTIFICATIONS, TAGS, CHARTS, ETC.

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

2. VALVE TAGS AND CHARTS

   A. Provide and install on each valve in the Mechanical Systems a 1-1/2" diameter circular brass tag fitted to each valve so that it cannot be removed. Each tag shall be embossed consecutively with letter and number identifiers as to system and purpose respectively. Letter identifiers shall be as follows:

      H Heating
      C Cooling
      HC Combination Heating/Cooling
      FP Fire Protection

      Number identifiers shall be determined by the Contractor sequentially. For example, valve No. HC-1 may be maintenance stops for fan coil units. HC-2 maintenance stops for air heaters, etc.

   B. Provide three (3) copies of typewritten valve charts indicating each valve identifier, the valves purpose and its location. For example: "HC-1 Fan Coil Maintenance Stop-one valve at supply and return of each fan coil unit." One (1) copy of this chart shall be mounted in suitable wood frame(s) with clear plastic or glass covers in a conspicuous location in the Mechanical Room. Two other copies shall be turned over to the Engineers.

   C. Where more than one major Mechanical room is indicated for the project, install mounted valve schedule in each major Mechanical Room, and repeat only main valves which are to be operated in conjunction with operations of more than single Mechanical Room.

EQUIPMENT: COLOR:	ENGRAVES:
Valve Yellow	V.
Fire Damper Black	F.D.
Smoke Damper Black	SM.D.
Volume Damper Black	V.D.
Terminal Unit Red	T.

3. PIPING IDENTIFICATION

   A. GENERAL

(1) Provide stenciled markers and arrows indicating direction of flow on all piping installed under this Contract. Markers and arrows shall be painted on the piping using machine cut stencils. All letters shall be sprayed using fast drying lacquer paint. All markers and arrows shall be properly oriented so that descriptive name may be easily read from the floor. At the Contractor's option, Setmark or equivalent manufactured marking system may be substituted for field marking. The following table describes the size of the color field and size of the identification letter which shall be used for pipes of different outside pipe diameters.

OUTSIDE DIAMETER OF PIPE OR COVERING	LENGTH OF COLOR FIELD	SIZE OF LETTERS
INCHES	INCHES	INCHES
3/4 TO 1-1/4	8	1/2
1-1/2 TO 2	8	3/4
2-1/2 TO 6	12	1-1/4
8 TO 10	24	2-1/2
OVER 10	32	3-1/2

(2) "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, storage areas, or unfinished rooms is to be considered as "exposed".

(3) All piping shall be marked not less than every 15 linear feet above a ceiling system, every 10 feet in a mechanical room, and at all points where lines pass through walls or floors.

(4) Provide pipe marker colors as indicated in the following table where manufactured marking systems are used:

PIPE+	MARKER COLOR+	ABBREVIATION
Chilled Water Supply*	Green with Black Letters	C.W.S.
Chilled Water Return	Green with Black Letters	C.W.R.
Condenser water supply & return	Slate Grey with White Letters	C.D.W.S. & C.D.W.R
Hot Water Supply*	Yellow with Black Letters	H.W.S.
Hot Water Return	Yellow with Black Letters	H.W.R.
Chilled/Hot Water Supply*	Green with Black Letters	C.H.W.S.
Chilled/Hot Water Return	Green with Black Letters	C.H.W.R.
Steam (Low, Medium & High Pressure)	Yellow with Black Letters	LPS, MPS, HPS
Condensate (Low, Medium & High Pressure)	Yellow with Black Letters	LPC, MPC, HPC
Domestic Cold Water	Green with Black Letters	D.C.W.
Domestic Hot Water	Yellow with Black Letters	D.H.W.
Recirculated Hot Water	Green with Black Letters	R.H.W.
Compressed Air	Blue with White Letters	C.A.
Natural Gas	Yellow with Black Letters	NAT. GAS
Propane Gas	Yellow with Black Letters	PROP. GAS
Fuel Oil (Supply, Return, Fill & Vent)	Yellow with Black Letters	FOS, FOR, FOF, FOV
Sanitary Sewer Piping	Green with Black Letters	SAN.
Sanitary Vent Piping	Green with Black Letters	VENT
Storm Sewer Piping	Green with Black Letters	STORM
Fire Protection Water	Red with White Letters	F.P.

Notes: *Color and number are from the Sherwin Williams System 4000 color selection guide dated 1999.

A. Piping, whether exposed or concealed, shall be marked not less than every 15 linear feet and at the points where the piping passes through wall or floors.

4. PIPE PAINTING (REFER ALSO TO ARCHITECTURAL SECTION ON PAINTING)

A. GENERAL

(1) All exposed piping installed shall be painted according to the color coding chart hereinafter specified.

(2) "Concealed", where used herein, shall mean hidden from sight as in trenches, chases, furred spaces, pipe shafts, or above hung finished ceilings. "Exposed" shall mean that piping or equipment is not "concealed" as defined above. Piping and equipment in service tunnels, mechanical equipment rooms, storage areas, or unfinished rooms is to be considered as "exposed".

(3) Paint all equipment and metal surfaces which are not factory finished (and all damaged or rusted surfaces) in high grade rust proofing machinery enamel. Pay particular attention to flanges, valves, unions, etc., where condensation may collect.

(4) Paint exposed pipe (whether insulated or bare) and exposed surfaces (tanks, etc.).

(5) All piping shall be painted in accordance with the following color coding chart.

PIPE+	PIPE COLOR CODE+	ABBREVIATION
Chilled Water Supply*	Green with Black Letters	C.W.S.
Chilled Water Return	Green with Black Letters	C.W.R.
Hot Water Supply*	Yellow with Black Letters	H.W.S.
Hot Water Return	Yellow with Black Letters	H.W.R.
Chilled/Hot Water Supply*	Green with Black Letters	C.H.W.S.
Chilled/Hot Water Return	Green with Black Letters	C.H.W.R.
Steam (Low, Medium & High Pressure)	Yellow with Black Letters	LPS, MPS, HPS
Condensate (Low, Medium & High Pressure)	Yellow with Black Letters	LPC, MPC, HPC
Domestic Cold Water	Green with Black Letters	D.C.W.
Domestic Hot Water	Yellow with Black Letters	D.H.W.
Recirculated Hot Water	Green with Black Letters	R.H.W.
Compressed Air	Blue with White Letters	C.A.
Natural Gas	Yellow with Black Letters	NAT. GAS
Propane Gas	Yellow with Black Letters	PROP. GAS
Fuel Oil (Supply, Return, Fill & Vent)	Yellow with Black Letters	FOS, FOR, FOF, FOV
Sanitary Sewer Piping	Green with Black Letters	SAN.
Sanitary Vent Piping	Green with Black Letters	VENT
Storm Sewer Piping	Green with Black Letters	STORM
Fire Protection Water	Red with White Letters	F.P.

* Includes pumps, air separator, valves, compression tanks, etc.

+ Where a pipe is not specifically identified in this table, painting and marking shall be in accordance with the most recent ANSI Standards.

B. Water heaters, storage tanks, heat exchangers, etc., shall be painted light gray.

C. All piping shall be marked. Piping shall be marked not less than every 15 linear feet above a ceiling system, every 10 feet in a mechanical room, and at all points where the piping passes through wall or floors.

5. EQUIPMENT IDENTIFICATION

A. All equipment, except in finished rooms, shall be identified by stenciling the title of the equipment as taken from the plans in a position that is clearly visible from the floor. The letters shall be made with black paint and shall be not less than two inches high. The titles shall be short and concise and abbreviations may be used as long as the meaning is clear. Lamacoid plates are also acceptable. In finished rooms or outdoors, equipment shall be identified by engraved nameplates.

6. DUCTWORK IDENTIFICATION

A. All ductwork shall be identified as to the service of the duct and direction of flow. The letters shall be at least two inches high and the flow arrow shall be at least six inches long. The letters and flow arrow shall be made by precut stencils and black oil base paint with aerosol can. Concealed ducts need not be identified.

7. ACCESS THROUGH CEILINGS

A. Mark the ceiling T-bar nearest the ceiling panel access or access panel (in the case of gyp board access panel installations) to equipment, valves, damper, filter, duct heaters, etc., with a small red lamacoid plate with name of item above ceiling. In finished areas or highly visible areas, coordinate the size, color, and finish of this tag with the architect prior to install.

END OF SECTION 20 24 00

SECTION 20 25 00 - HANGERS, CLAMPS, ATTACHMENTS, ETC.

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Provisions - Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. Each Contractor's attention is also directed to Section 201300, Pipe, Pipe Fittings and Pipe Support.

   C. This section includes, but is not limited to, furnishing and installing dampers, supports, anchors, and accessories for piping, ductwork, equipment, etc. Furnishing and installing shall be by each trade for the completion of their work.

   D. Power driven anchors and expansion anchors shall be permitted only when permission is granted in writing by the Architect and Engineer.

2. MATERIALS AND EQUIPMENT

   A. Hangers, Clamps, Attachments, Etc.:

	SIZE	SPECIFICATION
1. Pipe Rings	2" pipe and smaller	Adjustable swivel split ring or split pipe ring, Grinnell Figures 104 and 108, Elcen, Fee & Mason, or approved equivalent.
2. Pipe Clevis	2-1/2" pipe and larger	Adjustable wrought Clevis type, Grinnell Figure 260, Elcen, Fee & Mason, or approved equivalent.
3. Pipe Clevis	All	Steel Clevis for insulated pipe, Elcen Figure 12A, Grinnell, Fee & Mason or approved equivalent.
4. Rise Clamps	All	Extension pipe or riser clamp, Grinnell Figure 261, Elcen, Fee & Mason or approved equivalent.
5. Beam Clamps and Attachments	All	Grinnell Figure numbers listed or, Elcen, Fee & Mason, or approved equivalent. Malleable beam clamp with extension piece figure 229; I-beam

		clamp figure 131; C-clamp figures 83, 84, 85, 86, 87, and 88.
6. Brackets	All	Welded steel brackets medium weight, Grinnell Figure 195, Elcen, Fee & Mason or approved equivalent.
7. Concrete Inserts	All	Grinnell Figure numbers listed or, Elcen, Fee & Mason or approved equivalent. Wrought steel insert Figure 280 and wedge type insert Figure 281.
8. Concrete Fasteners	All	Self-drilling concrete inserts, Phillips, Grinnell, Elcen or approved equivalent.
9. Ceiling	All	Grinnell Figure numbers listed or Elcen, Fee & Mason, or approved equivalent. Pipe hanger flange Figure 153, adjustable swinging hanger flange Figure 155, ceiling flanges Figures 128 and 128R, and adjustable ceiling flange Figure 116.
10. Rod Attachments	All	Grinnell Figure numbers listed or Elcen, Fee & Mason, or approved equivalent. Extension piece Figure 157, rod coupling Figure 136, and forged steel turnbuckle Figure 230.
11. U-Bolts	All	Standard, U-bolt, Grinnell Figure 137, Elcen, Fee & Mason, or approved equivalent.
12. Welded Pipe Saddles	All	Pipe covering protection saddle sized for thickness of insulation, Grinnell Figure 186, Elcen, Fee & Mason or approved equivalent.
13. Pipe Roll	All	Adjustable swivel pipe roll, Grinnell Figure 174, Elcen, Fee & Mason, or approved equivalent.
14. Protection Saddle	All	18-gauge sheet metal pipe protection saddle, Elcen Figure 219, Fee & Mason, Power Strut, or approved equivalent.
15. Hanger Rods	All	Steel, diameter of the hanger threading, ASTM A-107.

16. Miscellaneous Steel	All	Steel angles, rods, bars, channels, etc., used in framing for supports and fabricated brackets, anchors, etc., shall conform to ASTM-A-7.
17. Concrete Channel Inserts	All	Continuous slot inserts, Unistrut, or approved equivalent. Heavy duty Series P-3200 or Light Duty Series P-3300 as required.
18. Adjustable Spot Insert	All	Adjustable spot insert Unistrut, or approved equivalent, P-3245. Design load 1000 lbs.

3. INSTALLATION

A. Unless otherwise specifically indicated or hereinafter specified in the specifications, all supporting, hanging and anchoring of piping, ductwork, equipment, etc., shall be done by each trade as is necessary for completion of the work and shall be as directed in the following paragraphs:

(1) Supporting and hanging shall be done so that excessive load will not be placed on any one hangers so as to allow for proper pitch and expansion of piping. Hangers and supports shall be placed as near as possible to joints, turns and branches.

(2) For concrete construction, utilize adjustable concrete inserts for fasteners. Expansion anchors and power-driven devices may be used when approved in writing by the Architect/Engineer. Utilize beam clamps for fastening to steel joists and beams and expansion anchors in masonry construction. When piping is run in joists, piping shall be top mounted on trapeze type hangers with each pipe individually clamped to trapeze hanger.

(3) Trapeze hangers shall be supported by steel rods of sufficient diameter to support piping from joists or concrete construction. Where desired or required, piping may be double mounted on trapeze hangers. Where conditions permit, trapeze hangers may be surface mounted on exposed joists by means of approved beam clamps, or to concrete construction by means of approved adjustable inserts or expansion anchors.

(4) Install all miscellaneous steel other than designed building structural members as required to provide means of securing hangers, supports, etc., where piping does not pass directly below or cross steel joists.

(5) Piping shall not be supported by the equipment to which it is connected. Support all piping so as to remove any load or stress from the equipment.

(6) Where piping, etc., is run vertically, approved riser clamps, brackets or other means shall be utilized at approximately 10'-0" center to center minimum and an approved

adjustable base stand or fitting on concrete support base shall be utilized at the base of the vertical run.

(7) Where piping is run along walls, knee braced angle frames or pipe brackets with saddles, clamps, and rollers (where required) mounted on structural brackets fastened to walls or columns shall be used.

(8) Support all ceiling hung equipment, with approved vibration isolators.

(9) Where copper tubing is specified, hangers shall be of copper clad type when piping is uninsulated.

(10) Uninsulated piping hung from above shall be supported with ring and clevis type pipe hangers. Uninsulated piping mounted on trapeze and wall bracket type support shall be held in place with U-bolts. U-bolts shall allow for axial movement in the piping.

(11) All insulated piping shall be supported with clevis type and/or pipe roll hangers. Hangers shall be sized to allow the pipe insulation to pass through the hangers. Install insulation protection saddles at all hanger locations. Welded pipe saddles shall be installed at all hangers on piping 5" and larger. The pipe saddles shall be sized for the thickness of insulation used. Hangers shall fit snugly around outside of insulation saddles.

(12) Under no conditions will perforated band iron or steel wire driven hangers be permitted.

(13) In general, support piping at the following spacing:

a. Steel and copper piping - 5 feet intervals for piping 3/4" and smaller. 6 feet intervals for 1 ¼" and 1" pipe. 8-foot intervals for piping 1 ½" to 3". 10-foot intervals piping 3 ½" and larger.

b. PVC piping – 4-foot intervals for piping 1 1/2" and smaller. 5-foot intervals for 2 and 2 ½" piping. 6-foot intervals for 3" pipe and larger.

c. Where the manufacturer of the pipe has more strict guidelines, the manufacturer's recommendations shall be followed.

END OF SECTION 20 25 00

SECTION 20 31 00 - TESTING, BALANCING, LUBRICATION AND ADJUSTMENTS

1. GENERAL

   A. The General Conditions, Instructions to Bidders, Section 200100, and other Contract Documents are a part of this specification and shall be binding on all Mechanical Contractors. It shall be each Contractor's responsibility to apprize himself of all information pertinent to their work prior to submitting their proposal. No adjustments will be made in this Contract which is a result of failure to comply with this requirement.

   B. The Engineer, or their authorized representative, shall be notified by the Contractor twenty-four (24) hours in advance of any tests called for in these specifications or required by others. Any leaks or imperfections found shall be corrected and a new test run to the satisfaction of the Engineer or their authorized representative. Upon completion of a test, a written approval of that part of the work will be given to the Contractor. Only after written approval, signed by the Engineer, shall the Contractor apply insulation or paint or allow their work to be furred in. This written approval, however, does not relieve the Contractor of the responsibilities for any failure during the guarantee period. The expense of all tests shall be borne by the Contractor, along with all temporary equipment, materials, gauges, etc. required for tests.

2. PLUMBING

   A. Piping shall be tested before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory.

   B. Water piping systems shall be subjected to a hydrostatic test of one hundred fifty pounds. The system shall be proven tight after a twenty-four (24) hour test.

   C. The house drain line, interior storm sewers, interior rainwater conductors, and all soil, waste and vent piping shall be subjected to a hydrostatic test of not less than a 10-foot head or an air test of not less than 5 lbs. per sq. inch using a mercury column gauge and shall hold for 15 minutes.

   D. Exterior sewer lines to the termination point outside the building shall be subject to a ten-foot hydrostatic test or an approved smoke test. These lines shall be subjected to a second test after 2 feet of backfill has been properly installed.

   E. After fixtures have been installed, the entire plumbing system, exclusive of the house sewer, shall be subjected to an air pressure test equivalent to one-inch water column and proven tight. The Contractor responsible shall furnish and install all of the test tees required, including those for isolating any portion of the system for tests.

   F. Thermometers and gauges shall be checked for accuracy. If instruments prove defective, they shall be replaced.

   G. The Contractor shall perform all additional tests that may be required by the Kentucky Department of Health or other governing agency.

H. Set temperature control on water heaters and adjust tempering valves as required.

I. Balance the water flow rate of each domestic hot water recirculating pump. Set the flow rate for each balancing valve in the recirculating hot water system. If flow rates are not indicated, contact the engineer for each balance valve GPM.

J. Any leaks or imperfections found shall be corrected and a new test run until satisfactory results are obtained. The cost of repair or restoration of surfaces damaged by leaks in any system shall be borne by the Contractor.

K. The compressed air system shall be tested for leaks for eight (8) hours at 250 PSI.

L. The natural gas piping shall be tested in accordance with requirements and/or recommendations of the local gas company.

M. Fuel oil piping shall be static tested at 250 PSI for eight (8) hours.

3. HEATING, VENTILATING AND AIR CONDITIONING

A. The Mechanical Contractor shall test all piping before being insulated or concealed in any manner. Where leaks or defects develop, required corrections shall be made and tests repeated until systems are proven satisfactory. Water piping systems shall be subjected to a hydrostatic test of not less than one hundred pounds and shall be proven tight after a twenty-four (24) hour test.

B. All motors, bearings, etc. shall be checked and lubricated as required during start-up procedures. All automatic, pressure regulating, and control valves shall be adjusted. Excessive noise or vibration shall be eliminated. Provide all start-up documents to Designer prior to any test and balance services.

C. System balancing, where required, shall be performed only by persons skilled in this work. The system shall be balanced as often as necessary to obtain desired system operation and results.

D. All fan belts shall be adjusted for proper operation of fans.

E. All deficiencies observed by the Test and Balance Contractor shall be reported immediately to the Engineer and Mechanical Contractor.

F. For the purpose of placing the heating, ventilating and air conditioning system in operation according to design conditions and certifying same, final testing and balancing shall be performed in complete accordance with AABC Standards for Total System Balance, Volume Six (2002), for air and hydronic systems as published by the Associated Air Balance Council. The following systems shall be test and balance:

(1) The supply and return air duct systems associated with RTUs. Provide static pressure profiles thru each system. Static pressure profiles shall include all sections from the return duct inlet and supply duct outlet of the air handling unit. Show

accurate representation of return, relief, outdoor and economizer damper locations. On units equipped with return air fans; show location and profile of the return fan.

(2) Balance all supply, return and exhaust air grille to within 10% of design air flow rate.

(3) Balance all exhaust air fans and record inlet static pressure.

(4) Balance domestic hot water return system including all balance valves and record settings and flows.

(5) Provide pre-construction test information on the following systems (_____). Information required is existing AHU air flow rate and static pressure profiles. Determine CFM of each diffuser in project renovation area. Provide 15 duct static pressure measurements where requested by engineer.

(6) Adjust all adjustable diffusers to minimize air drafts and eliminate suspended light fixture sway. Furthermore, adjustable diffusers in spaces with ceilings taller than 9 feet shall be adjusted to eliminate air stratification during heating season.

H. Provide a preliminary test report to the mechanical engineer immediately after the system is air balanced, or any initial phases are balanced. This report may be hand written. Anticipate visiting the site again after the engineer has reviewed the report. The engineer may request up to 15 additional static pressure measurements for any air handling system to help resolve any balancing deficiencies. Include five additional static pressure measurements for each exhaust air system.

I. The Test and Balance agency shall provide lifts, scaffolding, etc. as required to balance devices in areas with high ceilings such as gymnasiums, auditoriums, atriums, cupolas, etc. The Test and Balance agency may coordinate with the General Contractor or Mechanical Contractor to arrange for these items to be provided to access high devices, however, it is emphasized the Contractor is finally responsible for providing the means required to balance all devices.

J. Instruments used for testing and balancing of air and hydronic systems shall have been calibrated within a period of six months prior to balancing. All final test analysis reports shall include a letter of certification listing instrumentation used and last date of calibration.

K. Test and Balance agency is to provide sizing of fan or motor sheaves required for proper balance. The Mechanical Contractor will purchase and install all sheaves and belts as required. This includes new and existing equipment.

L. Four (4) copies of the complete test reports shall be submitted to the Consulting Engineer prior to final acceptance of the project. Preliminary test reports shall be submitted when requested.

M. The Contractor shall provide and coordinate their work in the following manner:

(1) Provide sufficient time before final completion date so that tests and balancing can be accomplished.

(2) Provide immediate labor and tools to make corrections when required without undue delay.

N. The Contractor shall put all heating, ventilating and air conditioning systems and equipment and range hood system into full operation and shall continue the operation of same during each working day of testing and balancing.

O. The test and balance contractor shall be present during the Engineer's final inspection of the building, or a separate project review date. The Engineer may request confirmation of the air balance report by asking for new measurements to be taken at that time. Any information in the test and balance report may be asked to be reconfirmed.

P. Balance all water and air systems. Be sure to include:

(1) Domestic Hot Water Recirculating System.

Q. Automatic Flow Control Balance Valves

(1) Verify that each installed automatic flow control device matches the GPM indicated on the drawings.

(2) Verify that the actual pressure at each automatic flow control device is within the pressure limits specified by the valve manufacturer.

4. FIRE PROTECTION SYSTEM

A. Test in accord with local Fire Marshall requirements and/or requirements or recommendations of NFPA Regulations.

END OF SECTION 20 31 00

SECTION 20 32 00 - MECHANICAL MAINTENANCE

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

2. MECHANICAL MAINTENANCE CONTRACT

   A. In addition to all other work indicated and specified, the Contractor shall provide the necessary skills and labor to assure the proper operation and to provide all required current preventative maintenance for all equipment and controls provided under Division 20 for a period of one year after substantial completion of the contract as defined in these specifications.

   B. The Contractor shall receive calls for any and all problems experienced in the operation of the equipment provided and shall take steps to immediately correct any deficiencies that may exist.

   C. The Contractor shall provide monthly inspection of all equipment and record the findings on a check list hereinafter specified.

   D. The Contractor shall provide a check list and shall post a copy of it in the main mechanical room. The check list shall be a list of each piece of equipment found in Division 20 of these specifications. The check list shall have a space for each of the next 12 months to provide a space for check-off. The Contractor shall certify on this check list that they has examined each piece of equipment and that, in their opinion, it is operating as intended by the manufacturer, it has been properly lubricated, and that all necessary current and preventative maintenance has been performed as recommended by the manufacturer and by good and accepted practice. This check list shall be approved in writing by the Engineers.

   E. All equipment that requires repairing shall be immediately serviced and repaired. Since the period of maintenance runs for one year concurrently with the warranty and guarantee, all parts and labor shall be furnished at no extra cost to the Owner.

   F. Control System - Once each month, the Control Sub-Contractor shall check all controls in the building to ascertain that they are functioning as designed and installed. This shall apply to all thermostats, aquastats, humidistats, freezestats, and firestats. This portion of the work shall be performed only by the Sub-Contractor that installed the controls.

   G. Filter maintenance shall be a special part of this contract and this Contractor shall inspect all filters once every month and shall clean or replace filter as necessary.

H. When emergency service is required beyond regular working hours to maintain the system in operation, the Contractor shall furnish such service.

I. Failure on the part of the Contractor to comply with all or part of this section of their work, will be required to relinquish a portion of their original contract sum. In general, that cost will be determined by the cost incurred by the owners to have work accomplished which should have, by contract, been accomplished by the Contractor.

END OF SECTION 20 32 00

SECTION 21 01 00 - FIRE PROTECTION SYSTEM

1. GENERAL

A. The General Conditions, Instructions to Bidders, Section 200100, 1. A, and other Contract Documents are a part of this specification and shall be binding on the Contractor. It shall be the Contractor's responsibility to apprise himself of all information pertinent to their work prior to submitting their proposal. No adjustments will be made in this Contract which is a result of failure to comply with this requirement.

B. No Contractor, other than those regularly engaged in the installation of approved and franchised automatic sprinkler systems, will be considered or approved for the work under this section of the specifications. Bidders must have had not less than five (5) years experience in the fabrication and erection of such systems: wet, dry and rack storage types, and shall have completed installations similar and equivalent in scope to this system under approval by one or more of the recognized Underwriting Associations in the Insurance Field.

C. Before submitting bid, examine all Mechanical, Architectural, and Structural Drawings, visit the site and become acquainted with all conditions that may, in any way whatsoever, affect the execution of this work. Also, the Contractor shall coordinate with the rating bureau and insuring agency to verify adequacy of water supply for the proposed sprinkler system extension.

D. The Contractor shall take their own measurements and be responsible for exact size and location of all openings required for installation of this work. Figured dimensions where indicated are reasonably accurate and should govern in setting out work. Detailed method of installation is not indicated. Where variations exist between described work and approved practice, the Engineer shall be consulted for directive.

E. It is the intent of the Plans and Specifications to provide a general layout only and locate major equipment, piping, etc. Variations in head locations, pipe routing, etc., may be anticipated by the Contractor and shall be coordinated with all other trades and indicated on the drawings and descriptive literature called for hereinafter. It shall be the express responsibility of the Contractor to provide all required materials and equipment and perform all work required to install a complete and approved installation.

F. All materials and methods shall be in accordance with applicable codes, regulations and/or ordinances and meet approval of local inspection authority and the State Fire Marshal. Also, all work shall comply with the latest editions of the National Board of Fire Underwriters, National Fire Protection Association, OSHA Regulations, the National Building Code, the Life Safety Code, IMC Code and the Southern Building Code (Where applicable). The local insuring agency shall review plans prepared and submitted by the Contractor but shall have no authority to make changes once work has begun.

G. All work performed under this section shall be accomplished in close harmony with all other trades. All work not so coordinated shall be removed and reinstalled at the expense of the Contractor.

H. The Contractor shall submit a proposed layout to the Engineer prior to submittal to the Fire Marshal's Office.

2. SCOPE OF WORK

A. Furnish all material, labor, tools, equipment and supervision required for installation of a complete fire protection and stand pipe system as indicated on the project drawings. Include all necessary piping, sprinkler heads, test connections, valves, drains, cabinets, siamese connections, fire hydrants, fire pump, etc.

B. The Contractor shall provide flushing and sterilization of all water lines in accordance with current Plumbing Codes, Rules and Regulations and shall make connection to domestic water mains in accord with current rules and regulations of the State Department of Sanitary Engineering and Division of Water.

C. Provide stand pipes with fire hose cabinets or fire valves as indicated or as required to meet the requirements of NFPA and the local fire authority.

D. Provide sprinklers in attics, overhangs, awnings, cooler/freezers, in accessible spaces and all other areas required by NFPA and the local fire authority.

E. Provide dry pipe systems or freeze proof heads as required to provide continuous coverage without freezing.

3. WATER SUPPLIES AND SYSTEM LAYOUT CRITERIA

A. Where flow and pressure data are available, they are indicated on the project drawings. The Contractor shall independently verify all such information and notify the engineer of any discrepancies discovered prior to beginning the work. Where no flow information is indicted on the project drawings, the Contractor shall obtain it and indicate it on the shop drawing submittal. Piping systems shall be hydraulically sized based on the most conservative flow information obtained. No adjustments in the contract amount will be allowed for failure of the Contractor to obtain adequate flow information.

4. DRAWINGS AND DESCRIPTIVE LITERATURE

A. The Contractor shall prepare and submit to the Engineers, an electronic copy of detailed drawings indicating their proposed Automatic Sprinkler System. These drawings shall indicate minimally the following components when they are used in the system.

(1) Name and address of Owner, Architect and Engineers.
(2) Make and type of sprinkler heads (Catalog cuts).
(3) Make and type of fire department connection (Catalog cuts).

(4) Make and type of post indicator valve (Catalog cuts).
(5) Make and type of detector check valve (Catalog cuts).
(6) Make and type of electric alarm bell (Catalog cuts).
(7) Make and type of retard chamber (Catalog cuts).
(8) Make and type of dry pipe alarm valve (Catalog cuts).
(9) Make and type of flanged check valve (Catalog cuts).
(10) Make and type of flanged gate valve (Catalog cuts).
(11) Make and type of automatic drains (Catalog cuts).
(12) Make and type of pipe hangers (1 catalog cut of each make and/or type).
(13) Make, type and electrical characteristics of:

a. The pressure sensing switch*.
b. The post indicator supervisory switch*.
c. The main gate valve supervisory switch*.
d. The flow switch*.
e. Air compressor.

(14) Make and type of fire pump (Catalog cuts).
(15) Make and type of jockey pump (Catalog cuts).
(16) Make and type of supervised O.S & Y valve.
(17) Make and type of indicating butterfly valve.
(18) Make and type of fire hose cabinets.
(19) Make and type of reduced pressure backflow preventer.

Note: All layouts and drawings are to be closely coordinated with the work of all other trades. The Engineers will, upon request, provide a complete set of Architectural, Structural, Mechanical and Electrical Plans and Specifications to aid the Contractor in this work.

*SPECIAL NOTE: 1) The items (indicated by asterisk) must be clearly coordinated with the Fire Alarm System supplier. 2) Supervisory switches located in wet locations (i.e., fire protection vault) shall be provided with NEMA 6 enclosures.

(20) On a set of drawings to the same scale as the drawings accompanying these specifications, indicate:

a. Each head location coordinated with lights, diffusers and other ceiling mounted device.
b. Location of all risers, mains, runout lines, etc.
c. Size of all risers, mains, runout lines, etc.
d. Location and type of pipe hangers.
e. All other information required by the Kentucky Department of Housing, Buildings and Construction.

The Contractor shall submit these drawings to the Engineer through the General Contractor/Construction Manager and Architect where applicable. The Contractor shall submit reviewed drawings to the Kentucky Department of Housing, Buildings and Construction for

their review and approval. No work shall be done until drawings are approved by the Kentucky Department of HBC.

5. SYSTEM DRAINAGE

A. The entire Standpipe and Sprinkler System (except that part which is below grade and will not freeze) shall be installed so as to allow 100% drainage.

B. All sprinkler branch piping shall be installed so as to drain back to the main riser.

C. Approved 2" drawoff piping shall be provided on sprinkler risers with discharge piping running to nearest floor drain or open air.

D. Where sprinkler piping is trapped, an approved auxiliary draw-off shall be provided and neatly installed.

E. All draw-offs shall have a metal tag labeled "Sprinkler Drain."

6. INSPECTIONS AND TESTS

A. Furnish all labor, equipment and conduct all required tests in the presence of the Owner and Engineer or designated representative.

B. All piping and devices comprising the fire protection system shall be tested under hydrostatic pressure of not less than 200 PSI and maintained for not less than two (2) hours.

C. Upon completion of their work, the Contractor shall submit a written and signed certificate to the Engineers indicating that they performed the above prescribed tests and rectified all malfunctions arising there from.

7. PERMITS

A. The Contractor shall obtain and pay for all necessary state, municipal, county, city and other permits and fees and pay all State taxes which are applicable.

8. GUARANTEE

A. All workmanship, equipment and material shall be guaranteed in writing against defects from any cause, other than misuse, for a period of one year after date of final acceptance.

9. ACCEPTANCE CERTIFICATE

A. Upon completion, the Contractor shall submit to the Engineers, a properly filled out "Sprinkler Contractor's Certificate Covering Materials and Tests." (4 copies).

10. CLEANING

A. Upon completion of this work all debris, material, and equipment shall be removed from the building and premises; all piping shall be cleaned ready for finish painting. Note: Do not remove rust inhibitive primer specified hereinafter.

11. PAINTING

A. All fire protection piping, fittings, etc., shall have one factory or shop coat of rust inhibitive primer. The Contractor shall thoroughly clean all such items in areas where the piping will be exposed so as to readily receive the finish coat specified in the Architectural Division of Painting. Colors shall be as specified in Identification Section of these specifications.

12. PIPE LAYING

A. Bell holes shall be excavated accurately to size and barrel of pipe shall bear firmly on bottom of trench throughout its length. All foreign matter and dirt shall be removed from the inside of the pipe before it is lowered into its position in the trench, and it shall be kept clean by approved means during and after laying. At times when pipe laying is not in progress, the open ends of pipe shall be closed by approved means, and no trench water shall be permitted to enter the pipe. Cutting of pipe, where necessary, shall be done in a neat and workmanlike manner, without damage to pipe. Refer also to Excavation.

13. EQUIPMENT AND MATERIALS

A. Signs

Appropriate code approved and required signs shall be installed on all control valves, drains, inspector's test, etc., indicating the function, installation, etc. Signs shall be neatly affixed with rust inhibitive screws, rivets or where hung from piping; with stainless steel No. 14 AWG wire.

B. Finish

All exposed materials such as valves, fire department connections, fire pump test headers, etc., shall be brass or chrome-plated brass.

C. Check Valves

(1) 2-1/2" and over; listed and approved by UL and FM; marked SV-FM; 175# working pressure; 1 BBM; flanged; equivalent to Mueller, Scott or Lunkenheimer.

(2) 2" and under; 150# working pressure; bronze; screwed; equivalent to Jenkins, Scott or Lunkenheimer.

D. Pipe & Fittings

(1) Nipples and fittings shall be of same material, composition, and weight classification as pipe in which installed.

(2) Up to 2" (Interior) Schedule 40 ASTM A-53 black steel; 125# cast iron screwed fittings or Schedule 10, ASTM A-135 black steel with victaulic or similar type approved fittings.

(3) 2-1/2" and larger (Interior) Schedule 40 black steel with flanged, welded or victaulic (or similar) type approved fittings or Schedule 10, ASTM A-135 black steel with victaulic or similar type approved fittings.

(4) Blazemaster or approved equivalent CPVC SDR 13.5 pipe UL listed for fire protection use. CPVC is not allowed for dry pipe systems and is only allowed in light hazard occupancies. Piping must be installed in accordance with the manufacturer's recommendation and all governing bodies having jurisdiction.

(5) Exterior: Class 200 PVC piping for exterior fire protection piping. Piping shall meet AWWA C900 requirements, be UL listed, Factory Mutual approved and NSF approved. Joints shall have spigot pipe ends with a flexible elastomeric ring seated in a groove to provide water tight seal. Minimum burst pressure to be 900 psi when tested in accordance with ASTM D1599. No. 8 copper wire (tracer wire) shall parallel all exterior PVC pipe.

(6) Dry Pipe System Piping: Same as standard system except Schedule 10 piping is not acceptable.

E. Clamps and Anchors

(1) Furnish and install approved clamps, as required, at all (45 degree) l/8 bends, (90 degree) 1/4 bends and flange and spigot pieces to the straight pipe to ensure permanent anchorage of all fire lines. Clamps, clamp rods, nuts, washers, and glands shall be coated with a quick drying coal tar bituminous paint after installation.

F. Hangers

(1) All piping shall be adequately and permanently supported in an approved manner on approved hangers (Submit with drawings).

G. Sleeves and Escutcheon Plates

(1) Furnish and install sleeves for pipes where piping penetrates masonry walls; exterior wall sleeves to be watertight. Fire and smoke stop all penetrations through fire and smoke walls and coordinate with General Contractor for locations.

(2) Furnish and install cast brass chrome plated split ring type escutcheons where piping penetrates walls, ceilings and floors, whether in finished areas or not.

H. Electric Wiring

(1) All electric wiring for the system which may be required shall be installed in accordance with the National Board of Fire Underwriters, and National Electric Code. The cost of this electric wiring shall be included under this Contract. All electrical wiring and conduit installed in fire protection pits shall be sealed watertight.

I. Inspection Test Connections & Pressure Gauges

(1) A 1" inspection test connection as required by the Kentucky Building Code. Discharge shall run to open air.

(2) Control valve for test connection shall be installed not over 7' above the floor.

(3) A pressure gauge at the inspection. Test connection at each location indicated on the Plans. Pressure gauges shall be 2-1/2" diameter and readable from the floor.

J. Gate Valves

(1) 2-1/2" and over; listed and approved by UL and FM; marked SV-FM; 175# working pressure; 1 BBM; OS&Y; flanged; cast iron discs; bronze seat rings; four-point wedging mechanism; equivalent to Mueller, Scott or Lunkenheimer.

(2) 2" and under; 150# working pressure; bronze; rising stem; screwed; bronze discs; bronze seat rings; two-point wedging mechanism; equivalent to Jenkins, Scott or Lunkenheimer.

K. Sprinkler Head Cabinet

(1) Furnish and install a cabinet, clearly labeled, with four (4) sprinklers of each type complete with required wrenches. Locate as directed by Engineer. Label "Sprinkler Heads."

L. Fire Department Connection

(1) Furnish and install a fire department connection with threads as approved by the local fire department; cast brass polished and chromium plated; with connection sizes and lettering as directed by the local authority having jurisdiction.

M. Fire Valve Cabinets

(1) Manufacturer. The products specified hereunder shall be Crocker or equivalent by Larsen's Mfg. Co., J.L. Industries, Kidde, or other nationally recognized manufacturer of cabinets conforming closely to specification requirements.

(2) Valve cabinets for recessed installation at all locations where shown shall be similar to Crocker Model No. 2700 with flat trim and clear glazed full glass door. Provide 18-

gauge steel tub, 20-gauge steel door, 16-gauge steel frame, and white enamel finish interior with all exposed exterior portions painted with color selected by Architect.

(3) Each cabinet shall be equipped with one 2-1/2" (or as required by the local authority) Fire Department valve with cap and chain. All connections and threads shall be as required by the local authority.

N. Fire Hose Valve

(1) Manufacturer. The products specified hereunder shall be Crocker or equivalent by Elkhart, Central Sprinkler, Kidde, or other nationally recognized manufacturer of hose valves conforming closely to specification requirements. Valve shall be with cap and chain. All connections shall be 2½" or as required by the local authority.

O. Siamese Hose Connection

(1) Furnish and install on the fire protection pit where required by the local authority a siamese hose connections with threads as approved by the local Fire Department. Unit shall be similar to Larsen's No. 15 sidewalk siamese, size: 2-1/2" x 2-1/2" x 6". Coordinate threads type with local Fire Department.

P. Post Indicator Valve

(1) Furnish and install a post indicator valve as required by the local authority. It shall be listed and approved by Underwriters Laboratories and Associated Factory Mutual Laboratories; Marked SV-FM; vertical; non-adjustable; with electric supervisory switch, handle, view window, brass padlock with (2) keys; gate valve to meet gate valve specifications, except to have non-rising stem and mechanical joint ends; equivalent to Mueller, Scott or Lunkenheimer.

Q. Detector Check Valve

(1) Furnish and install detector check valve as required by the local authority. It shall be listed and approved by Underwriter Laboratories and Associated Factory Mutual Laboratories; 175# working pressure; IBBM; flanged; with tapped bosses each side for by-pass meter trimming; equivalent to Viking, Badger or Grinnell.

(2) The Contractor shall contact the servicing water company and ascertain their policy pertaining to the by-pass water meter; if not furnished by water company. The Contractor shall furnish and install the by-pass meter and trimming as detailed on the drawings.

R. Sprinkler Heads

Gem, Grinnell, Star, Viking, Reliable, Central or approved equivalent as follows:

(1) Where piping is exposed: "Standard up right."

(2) Where piping is concealed above finished ceilings, provide two pieces, semi recessed, white plated sprinkler heads with removable escutcheon.

(3) Install sprinkler head guards where heads are subject to physical abuse. Heads located below seven (7) feet above floor, etc.

(4) Flexible Fire Protection Head Drops may be installed. Install in accordance with NFPA and manufacturer's requirements. Where flexible head drops are utilized, the minimum elbow bend radius shall be seven inches.

(5) Sprinkler head degree ratings shall be determined by the area serviced in accord with current Codes and Standard Practices. Indicate degree ratings on submitted Shop Drawings.

(6) The Contractor shall submit to the Engineer for inspection, one (1) sample of each type of sprinkler head, proposed to be used on the project.

(7) Where heads are installed in a tile ceiling, they shall be installed in the middle of the tiles, at half or quarter points along the length of the tiles. Install sprinkler heads at quarter points of center scoured 2' X 4' ceiling tiles.

(8) Provide high temperature heads around range hoods, kitchen equipment, kilns, boilers, water heaters and other heat producing equipment.

(9) Install quick response heads.

S. Air Compressor

(1) Furnish and install an air compressor. Locate adjacent to the sprinkler entrance. Riser and air compressor sized as required for the proposed installation. Contractor shall submit sizing data for approval. Unit shall be ____V/__Ø/60. Mount on vibration isolation springs similar to and of equal quality as Mason Industries Type SLF spring mounts.

T. Fire Protection Alarm Bell

(1) Furnish and install an 8 inch vibrating alarm bell. The device shall be installed outdoors on a weathertight backbox.
(2) Device shall be UL listed and installed per NFPA 13 requirements.
(3) The alarm bell shall be powered from the flow switch at the riser. Coordinate voltage with the flow detection device. Coordinate electrical power with the Electrical Contractor. Device shall be interconnected to alarm when the fire suppression system is activated.
(4) Minimum dB of 9 at 10 ft., Typical of 90 dB. Calculated using UL Standard 464.
(5) Device shall be red powder coated.

(6) Acceptable Manufacturers:

Grinnell, Potter, Viking, Mueller or Approved Equivalent.

U. Retard Chamber

(1) UL and C-UL Listed and rated for 300 psi
(2) Device shall be red powder coated.
(3) Acceptable Manufacturers:

Grinnell, Tyco, Potter, Viking or Approved Equivalent.

V. Flow Indicator Switches

(1) Furnish and install flow indicator switches as required by NFPA 13. All flow indicator switches shall be UL approved. Coordinate with Fire Alarm System supplier/installer. Provide a set of dry contacts on each flow switch for interface to the Control System if this control point is specified in the Controls Section.

W. Tamper Switches for Water Shut-Off Valves

(1) Furnish and install tamper switches where required by NFPA 13. All tamper switches shall be UL approved. Coordinate with fire alarm system supplier/installer. All tamper switches located in fire protection pits shall be waterproof, capable of operating beneath water similar to Potter PTS Series and be NFPA approved.

X. Fire Hydrant

(1) Furnish and install fire hydrants as approved by local Fire Department.

Y. Reduced Pressure Backflow Preventer

(1) Refer to plumbing specialties section of these specifications.

Z. Preaction System

(1) Provide a Single Interlocked Preaction cabinet with electric release containing all hydraulic and electrical components required for the control of a preaction system. The cabinet shall include the following:

a. Self-contained unit (with control panel) in sturdy free-standing 14-gauge steel cabinet, measuring:

1) 71"x36"x20" (180x91x51cm) for 1 ½", 2" & 3" systems

2) 71"x46"x24" (180x117x61cm) for 4" & 6" systems

b. Textured rust proof coating, inside and outside, fire red, oven baked polyester powder on phosphate base.

c. Two locked access doors to reduce front area required for opening, easily removable without tools to allow easy installation & servicing.

d. Individual access doors for the hydraulic and electrical sections and the emergency release (unlocked) with a neoprene gasket to avoid vibrations.

e. Deluge Valve, complete with Schedule 40 galvanized steel trim rated at 250 psi.

f. Integrated control panel, with emergency batteries in a top enclosure including a sprinklers storage rack.

g. Field wiring terminal strips integrated with the cabinet for connection of field wiring for detection system, audible devices, auxiliary contacts and power supply for air compressor.

h. Pressure gauges to indicate water supply pressure, priming water pressure and air pressure of the system.

i. Release trim with solenoid valve and each supervisory device required.

j. Schedule 40 steel pipe header with grooved ends to be connected to supply water.

k. Schedule 40 steel pipe drain manifold of 2" diameter for drain connections. Open drain cups in the cabinet and multiple drain manifolds will not be accepted.

(2) The cabinet assembly must be pre-assembled, pre-wired and factory tested under ISO-9001 conditions. It shall also be c-UL-us Listed, FM and MEA Approved as an assembled unit.

(3) Complete and functioning system shall meet all applicable codes, as listed below:

a. NFPA 13 (Installation of Sprinkler Systems)

b. NFPA 25 (Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems)

c. NFPA 72 (Standard for the Installation, Maintenance, and Use of Protective Signaling Systems)

d. NFPA 72E (Standard on Automatic Fire Detectors)

e. PBC (Pennsylvania Building Code)

f. National Building Code

g. National Fire Code

h. National Electrical Code

(4) Provide a complete electrical detection system including: system tubing, wiring, smoke detectors, signaling devices and connections to auxiliary functions. Provide detection and alarm indicating devices (24 Vdc bell, horn or strobe) to be compatible with the release control panel. A bell or a horn should be provided near the cabinet.

(5) Provide an internal air compressor as required for supervisory air. The air supply must be regulated and of the proper size in order to be able to restore normal system air pressure within 30 minutes. Size compressor as required for specific project. 120VAC, 60Hz. Air compressor and supervisory trim shall be factory installed inside the cabinet and adjusted for the required configuration.

(6) Sprinkler heads for the preaction system shall be as allowed by NFPA 13 for preaction systems and as specified in these specifications.

(7) The installation of the Preaction system must meet all established standards and be according to all applicable laws, regulations and codes. The proper operation and coordination for the system's installation, including the automatic sprinkler system, detection system, signaling system and initial start-ups are all under the responsibility of the contractor.

(8) The contractor must plan and organize a training session of at least two hours for the building maintenance staff, in the presence of building owner or their representative. The training session must include the normal operation, emergency procedures and system maintenance.

(9) Testing and Verifications of the system shall be as follows:

a. Hydrostatic tests must be performed on the entire sprinkler piping system, as required by NFPA 13.

b. In addition to the standard hydrostatic test, an air pressure leakage test at 40 psi (2.8 bars) shall be conducted for 24 hours. Any leakage that results in a loss of pressure in excess of 1 1/2 psi (0.1 bar) during the 24 hours shall be corrected.

c. A drain test using the auxiliary drain valve fully open (drain located on water supply side, deluge valve inlet) must be performed to make sure that no back pressure in drain piping exists, which could affect the proper operation of the preaction system.

d. An air supply test must be performed, to confirm that normal air pressure can be restored within 30 minutes.

e. The verification of the fire alarm system must be done in accordance with the NFPA 72.

(10) An inspection report and a certificate must be supplied to the engineer at the completion of the project. All tests results shall be registered in a booklet to be included with the inspection report.

(11) Acceptable Manufacturers: Reliable, Viking or Fire Flex.

14. GUARANTEE

A. All workmanship, equipment and material shall be guaranteed in writing against defects from any cause, other than misuse, or vandalism, for a period of one year after date of final acceptance.

END OF SECTION 21 01 00

SECTION 22 01 00 - PLUMBING SPECIALTIES

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work specified in this section.

   B. The Contractor shall provide all equipment and specialties complete with trim required and connect in a manner conforming to the State Building Code.

   C. The Contractor shall obtain exact centerline rough-in dimensions between partitions, walls, etc. as required for lay-out of their rough-in work. All work shall be roughed-in so that all exposed piping will be straight and true without bends or offsets.

   D. Prior to final inspection, test by operation at least twice, all equipment.

   E. Prior to final inspection, remove all stick-on labels, dirt, grease, other removable stampings, lettering, etc. from equipment and specialties and thoroughly clean same.

   F. All equipment and specialties shall be installed as recommended by the manufacturer in a neat and workmanlike manner. Unacceptable workmanship shall be removed and replaced at the installing Contractor's cost.

   G. All pipes, valves, fittings, fixtures, etc. for use in potable water systems 2” and below shall comply with federal lead-free requirements that the lead content of wetted surfaces cannot exceed 0.25% by weight.

   H. The Contractor shall raise or lower existing floor drains and/or clean outs to be flush with new floor surface.

2. DRAINAGE SPECIALTIES

   A. GENERAL

      (1) Provide all drainage specialties indicated, specified and/or required to provide complete and acceptable removal of all storm, sanitary, waste, laboratory waste, etc. from the building and into approved receptors.

      (2) Drainage specialties shall be on non-electrolytic conduction to the material to which they are connected.

      (3) Drainage specialties shall be installed in a manner so as to ensure no leakage of toxic or odorous gases or liquids and shall have traps and/or backflow preventers where required. Nor shall they allow backflow into other or existing systems.

B. CLEANOUTS - INTERIOR (CO)

(1) In addition to cleanouts indicated, provide cleanouts in soil and waste piping and storm drainage at the following minimum locations:

a. At base of each stack.
b. At fifty (50) foot maximum intervals in horizontal lines.
c. At each change of direction of a horizontal line.
d. As required by current KBC.
e. As required to permit rodding of entire system. (If in doubt, contact Engineers.)

(2) Water closets, slop sinks and other fixtures with fixed traps shall not be accepted as cleanouts.

(3) Cleanouts and/or test tees concealed in inaccessible pipe spaces, walls and other locations shall have an eight (8) inch by eight (8) inch (minimum) access panel or cover plates shall be set flush with finished floors and walls and shall be key or screw driver operable.

(4) Access panels for cleanouts shall be of the Zurn, 1460 series or equivalent by Josam or Watts. They may, at the Contractor's option, be Perma-Coated steel, prepared to receive finish. The Contractor shall coordinate the finish of all access panels installed in finished areas with Architect.

(5) Cleanouts and access panels shall be sized so as to permit the entry of a full sized rodding head capable of one hundred percent circumferential coverage of the line served.

(6) Provide a non-hardening mixture of graphite and grease on threads of all screwed cleanouts during installation.

(7) Do not install cleanouts against walls, partitions, etc. where rodding will be difficult or impossible. Extend past the obstruction.

(8) In finished walls, floors, etc., ensure that cleanouts are installed flush with finished surfaces and, where required, grout or otherwise finish in a neat and workmanlike manner.

(9) Cleanouts shall be as manufactured by Zurn, Josam, Jay R. Smith, Watts, MIFAB, Ancon or equivalent, similar to the following:

a. Zurn, Z-1440 cleanouts or Z-1445 cleanout tee at base of exposed stack and at change in direction of exposed lines.

b. Zurn, Z-1440 cleanout or Z-1445-1 cleanout tee where stacks are concealed in finished walls

c. Zurn, ZN-1400-T cleanout with square scoriated top in finished concrete and masonry tile floors.

d. Zurn, ZN-1400-Tx cleanout with square recessed top for tile in vinyl and linoleum finished floors.

e. Zurn, ZN-1400-Z cleanout with round recessed top for terrazzo floors.

f. Zurn, Z-1400-HD cleanout with tractor cover for exterior locations. Provide concrete supporting pad crowned to shed water. Refer to drawings for pad size.

g. Mueller, No. D-731 or D-714, Nibco, Flage or equivalent for cleanouts in copper waste with cover plates and/or access panels listed for other cleanouts.

h. Threaded hex head type cleanouts of same materials as pipe for piping 2" and smaller.

i. Zurn, cleanout with round top with adjustable retainer for carpet area. Install flush with carpet.

C. FLOOR DRAINS

(1) Provide floor drains at locations indicated and/or as required by State Building Code. Install in a neat and workmanlike manner. Coordinate locations with appropriate persons or party to ensure floor pitch to drain where required.

(2) Install floor drains in strict accordance with manufacturer's recommendations and the State Plumbing Code unless otherwise indicated.

(3) Each floor drain located on floors above the lowest floor shall be provided complete with a three (3) foot by three (3) foot, four (4) pound sheet lead flashing and clamping collar or chlorinated polyethylene shower pan liner of 30 mil. Lead pans shall be given a heavy coat of asphaltum on bottom and sides before installation and a heavy coat on exposed surfaces (if any). After installation, provide one ply of fifteen (15) pound roofing felt beneath each pan.

(4) Ensure by coordination with the appropriate persons or party that spaces served by a floor drain(s) has a water seal extending at least three (3) inches from the floor of the space served on all floors above the lowest level.

(5) The floor drains shall be Zurn, Josam, Watts, Jay R. Smith, MIFAB, Sioux Chief or equivalent.

D. TRAP PRIMERS

(1) Provide trap primers for all floor drains and open receptacle. Acceptable Trap Primer Manufacturers included Zurn, Precision Plumbing Products and Sioux Chief.

(2) For trap primers, any unused openings shall be capped.

(3) Provide an isolation valve for all trap primers.

E. CLEANOUTS (EXTERIOR) (ECO)

Provide exterior cleanouts at each location indicated and, in the manner, indicated. Permanently set all exterior cleanouts centered in a 30" X 30" X 6" deep concrete pad. The top of the concrete pad shall be flush with finished grade. The top of the cleanout box shall be flush with the top of the pad and shall be stamped "CO."

F. HEADWALLS (HW)

Provide at the locations indicated and/or as required by Federal, State and/or local codes, rules, regulations, standards and/or requirements, headwalls of the type required or indicated. Install as prescribed by local authority or as indicated, whichever is superior.

G. VARMINT GUARDS

Provide at each live discharge and/or culvert discharge (where culvert exceeds 30 linear feet in length) and where the line has a surface opening greater than one-half (2) square feet, a three (3) inch mesh steel varmint guard made up with frame and 3/8-inch minimum steel rods welded together and affixed tightly into the end of the open pipe.

3. WATER SUPPLY SPECIALTIES

A. GENERAL

(1) Provide all water supply specialties indicated, specified and/or required for the complete installation. Install in a neat and workmanlike manner in accordance with the manufacturer's recommendations and the State Plumbing Code.

(2) Where required by the State Plumbing Code, install code approved vacuum breakers in each water supply specialty.

B. WATER HAMMER ARRESTORS (WHA): Provide water hammer arrestors at each location indicated and/or as required to eliminate hydrostatic on the domestic water system. Provide at least one water hammer arrestor at all quick acting valve locations including:

Automatic Clothes Washers – Type “A”
Commercial Dishwashers – Type “B”

Sterilizers – Type “B”
Mop Basins (downstream of check valve) – Type “A”
Flush valve fixtures - Type “B” (Each toilet room with 1-3 flush valve fixtures shall have its own Type “B” water hammer arrestor.)

(1) Multiple Fixtures – Branch Line Less Than 20’ Long: The preferred location for a Zurn Shoktrol is at the end of the branch line between the last two fixtures when the branch lines do not exceed 20’ in length, from the start of the horizontal branch line to the last fixture supply on this line.

(2) Multiple Fixtures – Branch Line More Than 20’ Long: On branch lines over 20’ in length, use two Shoktrols whose capacities total the requirement of the branch. Locate one unit between the last and next to last fixture and the other unit approximately midway between the fixtures.

(3) Water hammer arrestors shall be Zurn, Z-1700, Shoktrol, Smith, Josam, Wade, or equivalent. Water hammer arrestors shall be stainless steel, bellows type. Field fabricated capped cylinders shall not be acceptable.

(4) Note: Provide insulation unions where arrestors are of dissimilar material from the piping served (unless piping is non-conducting, such as ABS or PVC).

MARK	MANUFACTURER & MODEL	SIZE	P.D.I. SIZE
TYPE "A"	ZURN, Z-1700 # 100	1-11	A
TYPE "B"	ZURN, Z-1700 # 200	12-32	B
TYPE "C"	ZURN, Z-1700 # 300	33-60	C
TYPE "D"	ZURN, Z-1700 # 400	61-113	D

C. PRESSURE REDUCING VALVES (PRV)

Install at each location indicated and/or as required to reduce domestic building water service to a maximum of eighty (80) PSIG code approved pressure reducing stations with by-pass. Install in a manner indicated or as required. Provide unions and stops for removal of station. PRV shall be adjustable from thirty (30) percent above or below reduced pressure. Where this cannot be attained with single stage, provide multi-staged reduction.

D. REDUCED PRESSURE BACKFLOW PREVENTERS (RPBP)

Watts #909 or equivalent reduced pressure backflow preventer. Provide with gate valves for isolation, FDA food grade strainer and air gap fitting. RPBP shall be UL listed.

E. DOUBLE CHECK VALVE ASSEMBLY

Watts #709, Watts #757, or equivalent double check valve assembly. Provide with FDA approved food grade strainer and gate valves for isolation. Assembly shall be UL listed.

END OF SECTION 22 01 00

SECTION 22 02 00 - PLUMBING FIXTURES, FITTINGS AND TRIM

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

B. The Contractor shall provide all fixtures complete with trim required and connect in a manner conforming to the State Plumbing Code.

C. The Contractor shall obtain exact centerline rough-in dimensions between partitions, walls, etc. as required for lay-out of their rough-in work. All work shall be roughed-in so that all exposed piping will be straight and true without bends or offsets.

D. All exposed piping or in casework below sinks, stops, traps, tailpieces, etc., shall be code approved chrome plated brass unless otherwise indicated or specified. Water supplies shall connect through walls with stops and chrome plated escutcheons with set screws.

E. All fittings, fixtures and trim shall be new unless otherwise indicated or specified. They shall also be of equivalent quality, dimensions, material, etc. as those specified. All faucets, shower heads, drains, levers, trim, etc. shall be constructed of metal and not plastic.

F. Handicapped fixtures shall be mounted as recommended by the State Building Code and ADA.

G. All fixtures shall be mounted as recommended by the manufacturer. Fixtures shall be rigidly mounted to walls and floors. Pay particular attention to flush valves and bracket concealed portion to building structure during rough-in. Loose, shaky flush valves, lavatories, etc. shall not be acceptable.

H. Prior to final inspection open all faucets and allow to run for fifteen (15) minutes, then remove all faucet aerators and thoroughly clean until smooth flow is obtained.

I. Prior to final inspection, test by operation at least twice:

(1) (Where applicable) adequate flow of hot and/or cold water at;

a. Shower Heads
b. All Faucets
c. Flush Valves and Tanks
d. Tub Drains
e. Hose Bibbs
f. Sill Cocks

g. All Other Valved Hot and/or Cold-Water Openings in the Plumbing System

(2) All toilet seats

(3) All flush tank overflows

J. Prior to final inspection, remove all stick-on labels, dirt, grease, other removable stampings, lettering, etc. from plumbing fixtures and thoroughly clean same.

K. All sink and lavatory traps shall have screw in plugs in the bottom for ease of cleaning and have mechanical fittings for ease of removal.

L. All fixtures shall be set level and true and shall be grouted into finished walls, floors, etc. in a neat and workmanlike manner with an approved waterproof non-yellowing grout for such service.

M. Special Note for Handicap Grab Rails: Coordinate top of shower valves, flush valves, flush tank, etc., with location of grab rails as shown on the architectural plans. The Contractor shall install all items to allow for installation, removal and service without removal of the grab bar.

N. All exposed drain pipes and domestic water piping under handicap accessible sinks and lavatories shall be insulated in accordance with ADA requirements and shall have a vinyl plastic covering over all insulation.

O. The Contractor shall obtain a copy of the casework shop drawings and confirm sinks, faucets, gas turrets, etc., will fit in the space provided. Additionally, in ADA applications with handicap sink base cabinets, the Contractor shall limit the total distance from the bottom of the sink to the bottom of the P-trap and coordinate waste pipe rough-in height to ensure the proper installation of the handicap sink base cabinet front closure panel. The Contractor shall not order sinks until they confirms no conflicts occur and shall adjust sink sizes if required. If the Contractor orders sinks, faucets, etc., that do not fit in the casework supplied, they shall replace them at no additional cost.

P. All lavatories, sinks, etc. shall be supplied with center rear drain outlets where necessary to avoid conflict with casework, handicapped kneeboards, etc. If the Contractor orders sinks that do not fit in the casework supplied, they shall replace them at no additional cost.

Q. All single supply faucets shall be provided with mechanical mixing valves unless otherwise noted. Mechanical mixing valves shall have hot and cold-water inlet connections, common outlet, in-line check valves, and adjustable temperature setting. Mixing valves shall be Moen model 104424 or equal. Provide one mixing valve per single supply faucet unless otherwise noted. Contractor shall provide all required connections and set mixing valve to required temperature.

R. All gooseneck faucets shall have rigid spouts, unless swing spouts are specified. If swing spouts are specified, the spout shall have a maximum swing of 140 degrees from side to side.

S. All plumbing fixtures shall comply with federal lead-free requirements that the lead content of wetted surfaces cannot exceed 0.25% by weight.

T. All water closet handles on ADA water closets shall be located on the approach side of the fixture.

2. FIXTURES AND TRIM

Available Manufacturers: Subject to compliance with requirements of manufacturers offering plumbing fixtures and trim. Plumbing fixtures and trim, which may be incorporated in the work include, but are not limited to, the following:

A. Plumbing Fixtures - Water Closet, Lavatory, Urinal, Bathtubs, Clinical Sink and Scrub Sink

American Standard, U.S. Plumbing Products
Eljer Plumbingware Div., Wallace-Murray Corp.
Kohler Co.
Crane Plumbing
Universal-Rundle
Toto
Zurn Co.
Sloan Fixtures
Acorn

B. Plumbing Trim

American Standard, U.S. Plumbing Products
Chicago Faucet Co.
Kohler Co.
Delta Co.
T&S Brass & Bronze Work Co. (Commercial)
Zurn Co.
Just Co.
Speakman Co.
Moen Commercial

C. Flush Valves

Delany Co.
Sloan Valve Co.
Zurn Co.
American Standard

D. Fixture Seats

Bemis Mfg. Co.
Church Seat Co.
Olsonite Corp., Olsonite Seats

E. Water Coolers

Elkay Mfg. Co.
Halsey Taylor Div., King-Sealey Thermos Co.
Haws Drinking Faucet Co.
Sloan Co.
Oasis Co.
Acorn AQUA

* Acceptable wall hung water coolers shall be equal to Oasis P8AM, Elkay EZS8 or Halsey Taylor HAC8FS. All other wall hung water coolers shall be subject to review of the Engineer.

F. Service Sinks and Mop Basins

American Standard, U.S. Plumbing Products
Eljer Plumbingware Div., Wallace-Murray Corp.
Fiat Products
Kohler Co.
Stern-Williams Co., Inc.
Florestone

G. Stainless Steel Sink

Elkay Mfg. Co.
Just Mfg. Co.
Moen, Div. of Stanadyne/Western
Sterling Co.

H. Fixture Carriers

Josam Mfg. Co.
Jay R. Smith
Tyler Pipe
Zurn Industries
Watts

I. Shower

Bradley Co.

Zurn Co.
Symmons Industries, Inc.
Chicago Faucets
Speakman Company
Powers
Acorn Co.
Moen Commercial

J. Shower Stalls

Clarion
Universal-Rundle
Aqua Bath
Aquarius
Aqua Glass
Acryline
Lasco Bathware

K. Canwash

Zurn Industries
Murdock
Woodford
Watts

L. Washer/Dryer Connection Box

Guy Gray Co.
Wolverine Brass, Inc.

M. Wash Fountain

Bradley Co.
Acorn Co.
Intersan
Willoughby

N. Shampoo Sink

Belvedere

O. Care Ware - Swingette, Swivette

Bradley Co.
Acorn Co.
White Hall Co.

P. Penal Ware

Bradley Co.
Acorn Co.
Willoughby

Q. Emergency Fixtures - Eyewash, Showers

Bradley Co.
Speakman Co.
Guardian Co.

R. P-Trap Insulation Kit (Trap Wrap)

Truebro
Brocar
Plumberex

Note: Kitchen, Lab, Science Room Fixtures, Special Equipment, Etc.

Contractor to provide final plumbing connections to all of the equipment furnished by Owner including, but not limited to: chrome supplies, stops, continuous drains, drain tailpiece, Code compliant "P" traps and escutcheons.

3. FIXTURE SELECTION

A. Refer to drawings for fixture schedule.

END OF SECTION 22 02 00

SECTION 22 03 00 - PLUMBING EQUIPMENT

1. GENERAL

   A. All plumbing equipment shall comply with the latest provisions of PBC.

   B. Provide magnesium anodes for water heaters and storage tanks.

2. WATER HEATER

   A. A.O. Smith or equivalent electric water heater; 50-gallon storage; copper sheathed tin coated elements (75 watt/sq. in. maximum density); glass lined tank; foam insulation; magnesium anode rod; automatic over-heat control; enameled steel jacket; (2) 4.5 KW elements wired for non-simultaneous operation; upper and lower thermostat; 460/3/60; with ASME temperature and pressure relief valve; set temperature at 105°F.
   B. AO Smith or equivalent point of use electric water heaters. Refer to schedule within contract documents.

3. EXPANSION TANK (DOMESTIC WATER)

   A. Amtrol Therm-X-Trol ST-5V expansion tank, pre-charged air chamber, stainless steel connection and heavy-duty butyl diaphragm.

4. RECIRCULATING DOMESTIC HOT WATER PUMPS

   A. Thrush, Armstrong, Bell and Gossett or approved equivalent all bronze in-line centrifugal circulating pump with mechanical seals, drip proof motor and all required overloads, starters and disconnects.
   B. Refer to schedule within contract documents.

5. SEWAGE GRINDER PUMPS

   A. Zoeller or equivalent duplex grinder pump for sanitary service. Refer to schedule in contract documents. Basin to be provided with pump, refer to contract documents.

END OF SECTION 22 03 00

SECTION 23 01 30 - HVAC DUCT SYSTEM CLEANING

1. GENERAL

A. SCOPE OF WORK

(1) This Section includes the requirement for cleaning of the existing supply air conveyance systems as noted on the Drawings and described below.

B. RELATED WORK SPECIFIED ELSEWHERE

(1) Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 00 and 01 Specification Sections, apply to this Section. The Contractor shall be responsible for the removal of visible surface contaminants and deposits from within the existing HVAC system supply air ductwork in accordance with these specifications.

C. SUBMITTALS

(1) After carefully reviewing the site and requirements, submit a complete work action outline similar to item A. Scope of Work above for review by the Engineer.

D. QUALITY ASSURANCE

(1) Contractor Qualifications: Contractor must be a certified member of the National Air Duct Cleaners Association (NADCA), and the Indoor Air Quality Association (IAQA).

E. COORDINATION

(1) Perform cleaning at appropriate time in project as to not interfere with other trades or the progress of the work, or existing occupants working in the building.

F. APPLICABLE STANDARDS

(1) National Air Duct Cleaners Association (NADCA) "ACR-2006, Assessment, Cleaning and Restoration of HVAC Systems, ", 2001.

(2) National Air Duct Cleaners Association (NADCA), "Understanding Microbial, Contamination in HVAC Systems,", 1996.

(3) National Air Duct Cleaners Association (NADCA), "Introduction to HVAC System Cleaning services," 2002.

(4) National Air Duct Cleaners Association (NADCA) Standard 05 "Requirements for the Installation of Service Openings in HVAC Systems, "1997.

(5) Underwriters Laboratories (UL), UL Standard 181.

(6) American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 62, Ventilation for Acceptable Indoor Air Quality.

(7) Environmental Protection Agency (EPA), "Building Air Quality, "December 1991.

(8) Sheet Metal and Air Conditioning Contractor's National Association (SMANCA):' HVAC Duct Construction Standards — Metal and Flexible," 1985.

2. EXECUTION

A. EXAMINATION

(1) Prior to the commencement of any cleaning work, the cleaning Contractor shall perform a visual inspection of the system to be cleaned to determine appropriate methods, tools, and equipment required to satisfactorily complete this project. Provide video and/or photo report of before and after conditions at multiple areas.

(2) Contractor shall conduct a site evaluation, and establish a specific, coordinated plan which details how each area of the building will be protected during the various phases of the project.

B. GENERAL CLEANING REQUIREMENTS

(1) Containment: Debris removed during cleaning shall be collected and precautions must be taken to ensure that Debris is not otherwise dispersed outside the HVAC system during the cleaning process.

(2) Particulate Collection: where the particulate collection equipment is exhausting inside the building, HEPA filtration with 99.97% collection efficiency for 0.3-micron size (or greater) particles shall be used. When the particulate collection equipment is exhausting outside the building, Mechanical Cleaning operations shall be undertaken only with particulate collection equipment in place, including adequate filtration to contain debris removed from the HVAC system. When the particulate collection equipment is exhausting outside the building, precautions shall be taken to locate the equipment down wind and away from all air intakes and other points of entry into any building.

(3) Controlling Odors: Measures shall be employed to control odors and/or mists vapors during the cleaning process.

(4) Component Cleaning: Cleaning methods shall be employed such that all components must be visibly clean as defined per NADCA applicable standards. Upon completion, all components shall be returned to those settings recorded just prior to cleaning operations.

(5) Air-Volume Control devices: Dampers and any air-directional mechanical devices inside the HVAC system must have their position marked beforehand so that they

can be returned to their pre-cleaning position.

(6) Service Openings: The Contractor shall utilize service openings, as required for proper cleaning, at various points of the HVAC system for physical mechanical entry, and inspection.

a. Contractor shall utilize the existing service openings already installed in the HVAC system where possible.

b. Additional openings shall be created by the Contractor as outlined on the Drawings to assist in plenum cleaning.

c. The Contractor shall remove and reinstall ceiling sections to gain access to HVAC systems during the cleaning process.

C. SANITIZING AND CLEANING

(1) Antimicrobial Agents and Coatings:

a. Apply antimicrobial agents and coatings according to manufacturer's written recommendations and EPA registration listing after the removal of surface deposits and debris.

b. Antimicrobial treatments and coatings shall be applied after the system is rendered clean.

c. Apply antimicrobial agents and coatings directly onto surfaces of interior ductwork.

d. Sanitizing agent products shall be registered by the EPA as specifically intended for use in HVAC systems and ductwork.

D. HEALTH AND SAFETY

(1) Safety Standards: Cleaning Contractor shall comply with applicable federal, state, and local requirements for protecting the safety of the Contractor's employees, building occupants, and the environment. In particular, all applicable standards of the Occupational Safety and Health Administrations (OSHA) shall be followed when working in accordance with this specification.

(2) Occupant Safety: No processes of materials shall be employed in such a manner that they will introduce additional hazards into occupied spaces.

END OF SECTION 23 01 30

SECTION 230200 - HVAC EQUIPMENT AND HYDRONIC SPECIALTIES

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified herein.

B. The Contractor shall provide in complete working order the following heating, ventilation and air conditioning equipment located as indicated and installed, connected and placed in operation in strict accordance with the manufacturer's recommendations. All equipment shall be factory painted and, where applicable, factory insulated and shall, where such standards exist, bear the label of the Underwriters Laboratory.

C. Each subcontractor shall be responsible for their own completion of System Verification Checklists/Manufacturer’s Checklist.

D. Factory startup is required for all HVAC equipment. In general, as part of the verification process, equipment suppliers shall perform start-up by their factory authorized technicians and shall complete and submit start-up reports/checklists. This shall include air handling units, boilers, chillers, cooling towers, VFDs, etc.

E. All HVAC equipment shall comply with the latest provisions of ASHRAE Standard 90 and/or International Energy Conservation Code 2012, whichever is more stringent.

F. Installation of all heating, ventilating and air conditioning systems shall be performed by a master HVAC contractor licensed in the state the work will be performed.

G. Note to Suppliers and Manufacturers Representative furnishing proposals for equipment for the project:

(1) Review the Controls Section of these Specifications (if applicable) to determine controls to be furnished by the equipment manufacturer, if any. The Contractor shall provide all controls with equipment unless specifically listed otherwise.

(2) Review the section of these specifications entitle: SHOP DRAWINGS, DESCRIPTIVE LITERATURE, MAINTENANCE MANUALS, PARTS LISTS, SPECIAL KEYS, TOOLS, ETC., and provide all documents called for therein.

(3) Ensure that the equipment which you propose to furnish may be installed, connected, placed in operation and easily maintained at the location and in the space allocated for it.

(4) Determine from the Bid Documents the date of completion of this project and ensure that equipment delivery schedules can be met so as to allow this completion date to be met.

(5) Where manufacturers' temperature controls are specified, they shall be in full compliance with International Mechanical Code Section 606 including automatic smoke shut down provisions.

(6) Provide factory start-up on site by a factory representative (not a third-party contractor) for all HVAC equipment, including pumps, VFDS, boilers, chillers, cooling towers, heat pumps, rooftop units, etc. Submit factory start-up reports to the Engineer.

(7) Provide training to the Owner by a factory representative for each type of equipment. Training shall be a minimum of eight (8) hours on site and the Engineer shall be notified one (1) week in advance of the training. Training shall only occur when the systems are complete and 100% functional. All training shall be video taped.

(8) Review the Section on Motor Starters and Electrical Requirements for Mechanical Equipment.

(9) Equipment incorporating energy recovery wheels shall be provided with an aluminum wheel with molecular sieve desiccant, 4 angstrom maximum sieve size. Wheels shall be certified in accordance with ASHRAE 84 or ARI 1060 standards.

(10) All condensate producing equipment shall be provided with a condensate trap as recommended by the equipment manufacturer and a condensate overflow switch.

(11) Provide low ambient and all required controls and accessories on all HVAC equipment to ensure they can provide cooling during the winter season.

(12) All outdoor HVAC equipment shall be provided with hail guards.

(13) Provide a complete air tight enclosure with opening door that seals air tight for all filters on air moving equipment.

(14) All equipment shall be furnished for a single point electrical connection unless specifically excluded as a requirement.

2. EQUIPMENT

A. PACKAGED AIR HANDLING UNIT

(1) Casing

Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0 and shall be 2 part injected foam. Panel design shall include no

exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

Exterior surfaces shall be constructed of painted galvanized steel, for aesthetics and long-term durability. Paint finish will include a base primer with a high-quality polyester resin topcoat. Finished, unabraded panel surfaces shall be exposed to an ASTM B117 salt spray environment and exhibit no visible red rust at a minimum of 3,000 hours exposure. Finished, abraded surfaces shall be tested per ASTM D1654, having a mean scribe creepage not exceeding 1/16" at 1,000 hours minimum exposure to an ASTM B117 salt spray environment. Measurements of results shall be quantified using ASTM D1654 in conjunction with ASTM D610 and ASTM D714 to evaluate blister and rust ratings.

Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal.

(2) Provide single zone unit consisting of economizer section, filter section, DX coil section, supply fan section, condensing unit section, return and discharge plenums with perforated liners as specified and detailed.

(3) All fan, filter and access sections shall have airtight hinged and gasketed full size access doors.

(4) Provide reinforced points of support for either setting or hanging units.

(5) Provide stainless steel drain pan located under entire coil section extensive enough to catch condensate leaving coil and moisture carry over at the unit operating velocities. Provide drain connection on side of unit. The pan shall be pitched in two planes to ensure complete drainage.

(6) Cover casing and frame with protective finish on all sides.

(7) Provide with directional air hood located on top of unit as indicated, refer to drawings for additional information.

(8) Water Coils

A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.

C. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

F. A drain pan overflow safety shall shut off the unit and issue a warning before over flow occurs.

(9) Fan Section

A. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

B. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

C. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

(10) Fan motors shall be provided with code approved motor starters. Motor starter shall contain an adjustable time delay relay, adjustable 0-60 seconds.

(11) Hot Gas Reheat

A. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser.

B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.

C. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.

D. Each coil shall be factory leak tested with high-pressure air under water.

(12) Heating Section

A. The rooftop unit shall include an electrical resistance heating coil section. Staged electric heating coil modules shall be factory installed downstream of the supply air fan in the heating section of the rooftop unit. Heating coils shall be constructed of a low watt density, nickel - chromium alloy resistance wire with intermediate supports that include ceramic bushings. The electrical contactors shall be of the full line-breaking type with all the electrical power legs being disconnected when the contactors are not energized. All electrical circuit wiring shall be designed with copper conductors, aluminum wires are not acceptable. Heating element branch circuits shall be individually fused to a maximum of 48 Amps per NEC requirements. The power supply for the electric heater shall be factory wired into the unit's main power block or disconnect switch.

B. The heating modules shall have an automatic reset, high temperature limit safety protection. A secondary high limit protection shall also be provided that requires a manual reset. An airflow switch shall be provided with the heating module to prevent the electric heater from operating in the event of no airflow.

C. The electric heat elements shall be controlled by the factory installed DDC unit control system. The heater shall have proportional SCR control. The unit controller shall modulate the electric heater to maintain the discharge air temperature setpoint.

D. Field installed heating modules shall require a field ETL certification. Duct heaters mounted within the rooftop unit in the field shall not be acceptable. The manufacturer’s rooftop unit ETL certification shall cover the complete unit including the electric heating modules.

(13) Insulation

Insulate unit casing from air entrance to fan section, to air outlet from unit. Insulate framing angles exposed to air stream. Securely attach 2" thick, 3# density insulation

minimum or of sufficient thickness and density to prevent condensation from forming on unit casing. Protect insulation against deterioration from air currents. Provide insulation with fire-retarding characteristics, complying with ANSI/NFPA 90A. Insulate drain pans as required to prevent condensate formation on unit exterior at ambient conditions to be encountered.

(14) Vibration Isolators

Provide high efficiency housed spring type vibration isolators to isolate the fan and motor section from the unit casing.

(15) Condensing Section

A. Outdoor coils shall have seamless copper tubes, mechanically bonded into aluminum plate-type fins. The fins shall have full drawn collars to completely cover the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

B. Outdoor air coils shall be protected from incidental contact to coil fins by a coil guard. Coil guard shall be constructed of cross wire welded steel with PVC coating.

C. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit in ambient conditions up to 125°F]. Mechanical cooling shall be provided to 0°F. Heat Pump Heating shall be provided to -10F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

D. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

E. The unit shall have a Daikin swing compressor. The compressor shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. [The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line. Variable Capacity compressors, two step compressors, fixed speed compressors, or anything other than a variable speed compressor will not be acceptable.

F. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.

G. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor

reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.

H. Each circuit shall be dehydrated and factory charged with R32 Refrigerant and oil.

(16) Internal Sealing

Seal top of heating/cooling coil and mating surface of F&B damper air tight to prohibit uncontrolled by-pass of air.

(17) Controls

A. Provide a complete integrated microprocessor based Direct Digital Control (DDC) system to control all unit functions including temperature control, scheduling, monitoring, unit safety protection, including compressor minimum run and minimum off times, and diagnostics. This system shall consist of all required temperature sensors, pressure sensors, controller and keypad/display operator interface. All MCBs and sensors shall be factory mounted, wired and tested.

B. The stand-alone DDC controllers shall not be dependent on communications with any on-site or remote PC or master control panel for proper unit operation. The microprocessor shall maintain existing set points and operate stand-alone if the unit loses either direct connect or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set schedules and control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.

C. The DDC control system shall permit starting and stopping of the unit locally or remotely. The control system shall be capable of providing a remote alarm indication. The unit control system shall provide for outside air damper actuation, emergency shutdown, remote heat enable/disable, remote cool enable/disable, heat indication, cool indication, and fan operation.

D. All digital inputs and outputs shall be protected against damage from transients or incorrect voltages. All field wiring shall be terminated at a separate, clearly marked terminal strip.

E. The DDC controller shall have a built-in time schedule. The schedule shall be programmable from the unit keypad interface. The schedule shall be maintained in nonvolatile memory to ensure that it is not lost during a power failure. There shall be one start/stop per day and a separate holiday schedule. The controller shall accept up to sixteen holidays each with up to a 5-day duration. Each unit shall also have the ability to accept a time schedule via BAS network communications.

F. The keypad interface shall allow convenient navigation and access to the commissioning functions. The unit keypad/display character format shall be 4 lines x 20 characters. All control settings shall be password protected against unauthorized changes. For ease of service, the display format shall be English language readout. Coded formats with look-up tables will not be accepted. The user interaction with the display shall provide the following information as a minimum:

1. Supply speed control
2. All Refrigeration Capacities and control input signals.
3. Refrigeration alarm details.
4. Return air temperature.
5. Discharge air temperature
6. Outdoor air temperature.
7. Space air temperature.
8. Outdoor enthalpy, high/low.
9. Compressor suction temperature and pressure.
10. Compressor head pressure and temperature.
11. Expansion valve position.
12. Condenser fan speed.
13. Inverter compressor speed.
14. Dirty filter indication.
15. Airflow verification.
16. Cooling status.
17. Control temperature (Changeover).
18. Cooling status/capacity.
19. Unit status.
20. All time schedules.
21. Previous alarms with time and date.
22. Optimal start.
23. System operating hours.

G. The user interaction with the keypad shall provide the following:

1. Controls mode
2. Cooling and heating change-over temperature with deadband.
3. Cooling discharge air temperature (DAT).
4. Supply reset options.
5. Temperature alarm limits.
6. Lockout control for compressors.
7. Compressor interstage timers.
8. Night setback and setup space temperature.
9. Economizer changeover.
10. Currently time and date.
11. Tenant override time.
12. Occupied/unoccupied time schedule.
13. One event schedule.

14. Holiday dates and duration.
15. Adjustable set points.
16. Service mode.

H. If the unit is to be programmed with a night setback or setup function, an optional space sensor shall be provided. Space sensors shall be available to support field selectable features. Sensor options shall include:

1. Zone sensor with tenant override switch.

I. To increase the efficiency of the cooling system the DDC controller shall include a discharge air temperature reset program for part load operating conditions. The discharge air temperature shall be controlled between a minimum and a maximum discharge air temperature (DAT) based on one of the following inputs:

1. Airflow.
2. Outside air temperature.
3. Space temperature.
4. Return air temperature.
5. External signal of 1-5 vdc.
6. External signal of 0-20 mA.
7. Network signal.

J. Units shall contain eight programmable input/output control ports to be controlled using the connected building automation system. These ports shall be input/output capable of utilizing the following signal types:

1. mA signal (0-20 mA – Adjustable).
2. VDC (0-10 VDC – Adjustable).
3. 10k Thermistor.
4. Digital on/off.

(18) A2L Leak Mitigation Refrigerant Detection System (RDS) for compressorized rooftop equipment using A2L Refrigerants.

A. Compressorized rooftop equipment using A2L refrigerant shall come equipped with a factory installed Refrigerant Detection System (RDS) in compliance with UL60335-2-40. The factory-installed unit controller will respond and control the unit to comply with UL60335-2-40 according to the alarm status of the refrigerant detection system. See the unit Operations Manual for a detailed sequence of operations.

B. The Refrigerant Detection System (RDS) shall consist of the following components:

1. Dedicated A2L Refrigerant Detection Control Board.
2. Refrigerant Sensor or Sensors. The number of sensors will vary based on the product and configuration as needed to comply with UL requirements.

C. Operation and Monitoring:

1. The refrigerant sensor or sensors communicate with the refrigerant detection control board. The refrigerant sensors detect the presence of the A2L refrigerant outside of the sealed refrigeration piping and communicate the levels to the refrigerant detection control board. The refrigerant detection controller communicates the RDS status to the factory-installed unit controller.
2. Alarm Communication: The unit controller will communicate RDS alarms based on the RDS status in the same way as any other alarm. Alarms are triggered by the following: 1) Refrigerant detected above 15% of the refrigerant lower flammability level (LFL); 2) Refrigerant Sensor Fault.
3. A customer relay is provided for the field to connect directly to the refrigerant detection control board as an alternative means to receive the above two alarm statuses.
4. A customer relay is provided for the field to connect directly to the refrigerant detection control board as an alternative means to receive the above two alarm statuses.
D. Factory unit wiring diagrams must show the refrigerant leak detection system wiring.

(19) Roof Curb

A. A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 4" high and include a nominal 2" x 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

(20) Air handling unit shall be Daikin, Aaon, Addison, Trane, or approved equivalent.

(21) Selection

Refer to the schedule on the plans.

B. VENTILATING FANS

(1) Ventilating fans shall be of the type, capacity, size, etc. here-in-after scheduled. Catalog numbers are listed as design criteria only. Alternate selections will be accepted provided quality, function, etc. are equivalent. All fans shall be UL listed, complete with all required disconnects and starters and shall be AMCA rated and certified. Model numbers listed are Greenheck, acceptable alternates are Penn, Carnes, Acme, Shipman, Jenn-Aire and Loren-Cook. The Architect shall select the color for all exposed fans.

(2) Selection

Refer to the schedule on the plans.

C. DUCTLESS SPLIT SYSTEMS

(1) Refer to schedule on the plans. Indoor unit and outdoor condensing unit shall be provided by the same manufacturer. All required installation hardware to be provided. Refrigerant piping shall be installed per manufacturer recommendations and requirements.

D. ELECTRIC UNIT HEATERS

(1) Refer to schedule on the plans. Unit heaters shall be provided with all necessary mounting hardware, whether ceiling mounted or recessed in wall.

E. AUTOMATIC FIRE VENTS (FV-1)

(1) Furnish and install automatic Fire Vent Type DSH 6' x 4' as manufactured by The Bilco Company or approved equivalent. Covers shall be 14-gauge paint bond galvanized steel with 3" beaded flange neatly welded. Insulation shall be of glass fiber 1" in thickness, fully covered and protected by a 22-gauge paint bond galvanized steel cover liner. Curb shall be of 14-gauge galvanized paint bond steel 12" in height on hinge sides with a 5N pitch to the fixed center channel. Curb shall be formed with a 3-1/2" flange with holes for securing to the roof deck and with an integral metal capflashing of the same gauge and material as the curb, fully welded for weathertightness. Insulation on the exterior of the curb shall be rigid fiberboard 1" in thickness. Curb shall be 12" tall, special to match the metal building roof type, with metal insulation liner of same material as the curb. All hardware shall be zinc plated and chromate sealed. Factory finish shall be red oxide primer on steel.

(2) Vent shall be completely assembled with a positive hold/release mechanism, heavy pintle hinges, compression spring operators, thermoplastic rubber gasket, heavy duty shock absorbers and pull handles for inside and outside operation. It shall open automatically when heat breaks the 165° fusible link and shall be labeled as being FM Approved or UL Listed. Installation shall be in accordance with manufacturer's instructions. Manufacturer shall guarantee against defects in material or workmanship for a period of five years. Contractor shall test for proper operation after installation by fusing the link, and a replacement fusible link shall be furnished with the vent.

F. HYDRONIC SPECIALTIES

(1) Manufacturers

Subject to compliance with the specified and scheduled requirements the following manufacturers will be considered, but not limited to:

Hoffman
Amtrol/Thrush
Armstrong/Aurora

Bell & Gossett
Patterson
Taco
Victaulic
Wheatley

(2) Air Release Tank

The air release tank shall be of the in-the-pipe-line type with flanged tangential openings for inlet and outlet connections. The inside shall be specifically designed to create a low velocity vortex for the separation of free air from the water stream. The tank shell shall be rated at 125 PSI working pressure and shall be constructed with the ASME code for unfired pressure vessels and shall be so certified and stamped. The tank shall be equipped with a bottom drain connection and expansion tank/vent connection. Tank shall be line sized. Tank shall not have a strainer.

(3) Expansion Tank

The tank shall be constructed in accordance with the ASME Code for unfired pressure vessels and shall be suitable for 125 PSI water working pressure and 340ºF maximum water temperature. The tank shall be a pre-charged, heavy duty butyl rubber diaphragm-type pressure vessel complete with standard tire charging valve. Refer to the plans for mounting orientation. Capacities shall be as scheduled on the drawings.

(4) Factory-Assembled Drops

Contractor has the option to utilize pump drop assemblies in lieu of traditional method consisting of flexible connectors and flanged components. Pump Drops shall consist of orange enamel coated assembly, consisting of a Class 150 flange for pump connection, Standard of Acceptance: Victaulic Series 380/381/385/26.

Suction Vibration Isolation Pump Drop: Factory assembled grooved end vibration pump suction drop for pipe sizes 3” through 12”. Consisting of a suction diffuser with stainless steel basket and diffuser, Vic-300 butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool with thermometer and or pressure ports. Assembly is installation-ready, with flexible couplings to accommodate vibration attenuation and stress relief. Assembly rated for working pressure to 300-psig.

Discharge Vibration Isolation Pump Drop: Factory assembled grooved end vibration pump discharge drop for pipe sizes 3” through 12”. Consisting of tri-service valve assembly, which includes a 779 spring-actuated check valve and Vic-300 butterfly valve with offset stem for 360-degree circumferential seating, and pipe spool with thermometer and pressure ports. Assembly is installation ready, with flexible couplings to accommodate vibration attenuation and stress relief. Assembly rated for working pressure is 300-psig.

(5) Suction Diffusers

Provide at the inlet of each base mounted pump, a suction diffuser as manufactured by Bell and Gossett, Victaulic, Thrush, or approved equivalent. Each suction diffuser shall be equipped with a disposable fine mesh start-up strainer and an adjustable support foot to carry weight of inlet piping. Victaulic Series 731 G, W731G, Bell and Gossett Suction Diffuser, or equal.

(6) Triple Duty Valves

Provide at the discharge of each base mounted pump and where shown on the plans, a triple duty valve as manufactured by Bell & Gossett, Thrush or Engineer approved equivalent. Each valve shall perform check, shut-off and throttling functions and shall be line sized.

Alternatively, in lieu of a triple duty valve, a Victaulic grooved end “Tri-Service” valve assembly may be used in applicable piping systems. The assembly shall consist of a Victaulic Vic-300 MasterSeal™ butterfly valve with memory stop feature for shut-off and balancing, and a 779 Venturi-Check for backflow prevention and flow measurement.

(7) Flexible Connections

Provide at the inlet and discharge side of each base mounted pump, at each connection to major equipment requiring vibration isolation and where shown on plans, a flexible connector, Metraflex Metrasphere or Engineer approved equal. Flexible connectors shall be of the flexible neoprene and nylon or EPDM and suitable for 225 PSI working pressure and 230°F temperature. Couplings shall be installed per the manufacturer's recommendations, in close proximity to the source of the vibration.

Alternatively, in lieu of a flexible connector, three (3) Victaulic Style 77 flexible couplings may be used on suction side and discharge side of base mounted pumps (six Victaulic flexible couplings per pump).

(8) Pressure Reducing Valve

Provide at the point of connection of the domestic water line to the hydronic system and where shown on the plans, a pressure reducing valve by Thrush, Bell and Gossett, or Engineer approved equivalent. Such pressure reducing shall be provided with an inlet strainer and shall be set to maintain a pressure of 4 PSI in excess of that at the highest point in the hydronic system. Each pressure reducing valves shall be line sized.

(9) Vacuum Breaker

Provide, where shown on the plans, a vacuum breaker as manufactured by Huffman, Jackson or Engineer approved equivalent.

(10) Manual Air Vents

Provide, where shown on the plans, at each rise in piping and where required a manual air vent.

(11) Automatic Air Vents

Provide, where shown on the plans, automatic air vents.

(12) Expansion Loops

Expansion loops shall be Metaflex Metra loops or Engineer approved equivalent. Install with pipe guides and anchors as recommended by the manufacturer in all piping runs 75 feet long or greater and also where indicated on the plans.

Alternatively, in water piping systems, use adequate numbers of Victaulic Style 77 flexible couplings in header piping to accommodate thermal growth and contraction, and as required for the elimination of expansion loops. (In accordance with Victaulic recommendations and as approved by the Engineer). Where expansion loops are required in Victaulic piping systems, use Victaulic flexible couplings on the loop(s).

2. FACTORY START-UP REPORTS

A. Provide factory start-up on site by a factory representative (not a third-party contractor) for all HVAC equipment, including rooftop units. Submit factory start-up reports to the Engineer. The Mechanical Contractor and the Controls Contractor shall have a representative on site to correct all deficiencies noted by the factory representative. For each deficiency noted, documentation of corrective action taken shall be submitted to Engineer.

B. At a minimum, the report submitted to the Engineer shall include the following data:

(1) Air Handling Units

a. Verify economizer operation
b. Verify operating per sequence of control
c. Discharge air temperature sensor calibration
d. Discharge static pressure
e. Dirty filter differential pressure switch function
f. Outside air temperature sensors calibration
g. Return air temperature sensor calibration
h. Airflow monitoring station calibration
i. VFD response to pressure sensors or other DDC input
j. Smoke detection shut down
k. Freeze protection sequence
l. Fan bearings lubrication
m. Fan not vibrating
n. Fan motor volts / amps
o. Check drive belt tension

p. Check sheave alignment
q. Coils clean
r. Dampers operating properly
s. Filters clean
t. Fan rotation direction

3. HVAC SYSTEM START-UP PROCEDURE

A. GENERAL

(1) The goal of this procedure is for a few units to run as much as possible with the coils as cold as possible to "wring out" the water and allow it to drain away in the condensate drain pans. Allowing all units to cycle on and off, running for short periods of time, does not dehumidify the air in the building. Starting the system without following the steps outlined will raise the relative humidity in the building and most likely cause condensation on some of the building surfaces and HVAC system that the Contractor will be responsible to correct.

(2) The high humidity and condensation occurs in school buildings at start up primarily because the building is only partly occupied (or not occupied) when the HVAC system is started. Most people believe that the answer to this problem is to turn the thermostats down very low. The assumption is that cold air will not hold moisture. That is not true. What happens is that the thermostats are quickly satisfied thermally because there is very little cooling load on the building and the cooling equipment. The terminal units then only have to run for a very short period of time to keep the thermostats satisfied and the relative humidity of the air is in fact raising. The goal is to cause the moist air to pass over coils which are cooling it and drying it without allowing more moist air to be introduced into the building.

(3) To reduce the always present high humidity start-up problem, we have devised this start-up procedure that will minimize the adverse effects of the start-up. As the building sits at start-up, all of the walls, floor, and ceilings are saturated with moisture from the air and also moisture is being released from the drying paint and curing concrete and mortar.

(4) The following procedure will slowly bring down the temperature and humidity in the lightly loaded building. It will also allow the HVAC equipment to more closely match the actual building load without students and equipment in use.

To reach these goals we require the following:

(1) Set 1/3 of the units (approximately every third unit) on 74°F (no lower). Set the other thermostats for a cooling setpoint of 90°F so the units will not cool. Override the controls so that the fans in all units will circulate air.

(2) Leave all of the interior doors open to allow the air to mix throughout the building.

(3) Close all exterior windows and doors.

(4) Turn off all exhaust fans and outside air units. Outside air unit exhaust and outside air dampers shall be closed.

(5) Leave all of the lights on in the building to provide a cooling load.

(6) Provide portable electric heaters or dehumidifiers in any room that shows signs of condensation.

Here is a list of things you should not do:

(1) Do not prop the exterior doors open during construction or while moving in furnishings.

(2) Do not start all of the units until students are starting school. When students start school the normal setpoints, schedules, and fan cycling shall begin.

END OF SECTION 23 02 00

SECTION 23 03 00 - CONDENSATE DRAINAGE SYSTEM (FOR COOLING EQUIPMENT)

1. GENERAL

   A. The Contractor's attention is directed to the General and Special Conditions, General Conditions-Mechanical and to all other Contract Documents as they apply to this section of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section and which are hereby made a part of the work specified in this section.

   B. The Contractor shall provide a complete condensate drainage system to carry all condensate discharge from all cooling equipment from the building. Condensate system shall be installed in accordance with IMC. Provide condensate overflow switch for all condensate producing equipment.

   C. Pipe installation and fabrication shall be in accordance with the section of these specifications entitled PIPE, PIPE FITTINGS AND PIPE SUPPORT and as hereinafter specified.

   D. All piping shall be installed concealed, unless specifically noted otherwise and shall be installed under slabs or underground only when specifically indicated.

   E. Lines installed in ceiling spaces shall be held at the maximum possible elevation and shall be coordinated with all other trades to avoid conflicts.

   F. Condensate drain lines shall be pitched 1/4 inch per foot and installed with cleanout plugs at each change in direction and/or at thirty (30) foot intervals. Where this minimum pitch cannot be attained, contact Engineers.

   G. Horizontal runs of condensate drain lines shall be supported at six (6) foot intervals maximum, or more frequently where required to prevent sags and low spots.

   H. Lengths of horizontal lines shall be held at a minimum due to potential lint collection.

   I. Provide condensate traps in accordance with the manufacturer’s recommendations.

2. MATERIAL

   A. Refer to Section of these Specifications entitled: PIPE, PIPE FITTINGS AND SUPPORT.

3. INSULATION

   A. Refer to Section of these Specifications entitled: INSULATION - MECHANICAL.

END OF SECTION 23 03 00

SECTION 23 11 00 - REGISTERS, GRILLES, DIFFUSERS AND LOUVERS

1. REGISTERS, GRILLES AND DIFFUSERS

   A. GENERAL

      Alternate R, G & D selections, other than manufacturers and models listed below, will be accepted, provided quality, function and characteristics are equivalent. Acceptable alternates are Price, Titus, Metalaire, Carnes, Anemostat, Krueger, and Tuttle & Bailey. Shop drawings shall identify and list all characteristics of each device exactly as scheduled herein. Finishes shall be selected by the Architect. If Architect elects not to select color, all colors shall be off-white. Factory color samples shall be submitted with shop drawings.

   B. SELECTION

      Refer to the Selections Scheduled on the Drawings.

2. LOUVERS

   A. GENERAL

      Alternate louver selections, other than manufacturer and model listed below, will be accepted, provided quality, function and characteristics are equivalent. Acceptable alternates are Ruskin, Air Balance, Airline, Airstream, Louvers and Dampers and Penn. Shop drawings shall identify and list all characteristics of each device exactly as scheduled herein. Finishes shall be selected by the Architect unless scheduled otherwise.

   B. LINTELS

      Provide lintels above all louvers as required. Refer to the lintel schedule in Specification Section 201100.

   C. SELECTION

      Refer to the Selections Scheduled on the Drawings.

END OF SECTION 23 11 00

SECTION 23 12 00 - SHEET METAL AND FLEXIBLE DUCT

1. GENERAL

A. The Contractor's attention is directed to the General and Special Conditions, General Requirements-Mechanical and to all other Contract Documents as they apply to this branch of the work. Attention is also directed to all other sections of the Contract Documents which affect the work of this section, and which are hereby made a part of the work specified herein.

B. This branch of the work includes all materials, labor and accessories for the fabrication and installation of all sheet metal work as shown on the drawings and/or as specified herein. Where construction methods for various items are not indicated on the drawings or specified herein, all such work shall be fabricated and installed in accordance with the recommended methods outlined in the latest edition of SMACNA's HVAC Duct Construction Standards, Metal and Flexible, and its subsequent addenda. HVAC duct systems shall be fabricated and installed in accordance with the SMACNA duct construction standards (SMACNA-HVAC and SMACNA-Seismic) including Appendix B of the Seismic Restraint Manual Guidelines for Mechanical Systems. These references and plate numbers shall be used by the Engineer for required sheet metal thicknesses and final acceptance of methods of fabrication, hanging, accessories, etc. All equipment furnished by manufacturers shall be installed in strict accord with their recommended methods.

C. Ductwork shall be constructed and installed per the latest edition of the International Mechanical Code.

D. Ductwork shall be kept clean at all times. Ductwork stored on the job site shall be placed a minimum of 4” above the floor and shall be completely covered in plastic. Installed ductwork shall be protected with plastic to prohibit dust and dirt from entering the installed ductwork, air handling unit, terminal devices, etc. Provide temporary filters on all return grilles and duct openings if the units are running prior to the building being satisfactorily cleaned. Do not install the ductwork if the building is not “dried-in”. If this is required, the open ends of duct shall be covered in plastic to protect. The Owner/Engineer shall periodically inspect that these procedures are followed. If deemed unacceptable, the Contractor shall be required to clean the duct system utilizing a NADCA certified Contractor.

Prior to purchase and fabrication of ductwork (shop fabricated or manufactured), the Contractor shall coordinate installations with new and existing conditions. Notify the Engineer if there are any discrepancies for resolution.

E. Provide a SMACNA duct cleanliness level “C” per the latest SMACNA standards. [Refer to LEED / Healthcare Requirements]

F. If separate filter grilles are specified for an HVAC unit, the Contractors shall remove any unit mounted filters and blank off the unused filter access opening with sheet metal and seal airtight.

G. Wall Penetrations: Where ducts penetrate interior or exterior walls, the walls shall be sealed airtight. Refer to the sleeving, cutting, patching, and repairing section of the specifications for additional requirements.

H. Duct dimensions indicated are required inside clear dimensions. Plan duct layouts for adequate insulation and fitting clearance.

I. Prior to purchase/shipment of the ductwork, manufacturer shall provide as part of the submittal process scaled, field coordinated AutoCAD drawings of the complete system to be furnished. Drawings will indicate all system components including fittings, ductwork, and manifolds. Drawings shall be available in an electronic format.

2. LOW PRESSURE DUCTWORK

A. General (Low Pressure)

(1) Double turning vanes shall be installed in all square turns and in any other locations indicated.

(2) Provide a “high efficiency” type take-off with round damper (Flexmaster STOD-B03 or approved equal) for all round duct branches from a rectangular main to a GRD. Refer to the detail on the drawings for all installation requirements.

(3) Cross-break all ducts where any duct section dimension or length is 18" or larger.

(4) Air volume dampers shall be installed in each duct branch takeoffs and/or where indicated, whichever is more stringent. All such dampers shall be accessible without damage to finishes or insulation and shall be provided where required for proper system balance.

(5) Splitter dampers shall be provided in all rectangular supply air duct tees. Damper blade operator shall extend a minimum two inches thru the insulation.

(6) Unless otherwise dimensioned on the drawings, all diffusers, registers and grilles shall be located aesthetically and symmetrically with respect to lighting, ceiling patterns, doors, masonry bond, etc. Locate all supply, return and exhaust diffusers and grilles in the locations shown on the architectural reflected ceiling plan.

(7) Ducts shall be hung by angles, rods, 18 ga. minimum straps, trapezes, etc., in accordance with SMACNA's recommended practices. Duct supports shall not exceed 12 ft intervals. There shall be no less than one set of hangers for each section of ductwork. Where ductwork contains filter sections, coils, fans or other equipment or items, such equipment or items shall be hung independently of ductwork with rods or angles. Do not suspend ducts from purlins or other weak structural members where no additional weight may be applied. If in doubt, consult the structural engineer.

(8) Provide approved flexible connectors at inlet and outlet of each item of heating and cooling equipment whether indicated or not. Install so as to facilitate removal of equipment as well as for vibration and noise control.

(9) All ductwork connections, fittings, joints, etc., including longitudinal and transverse joints, seams and connections shall be sealed. Seal with medium pressure, smooth-textured, water based duct sealant. Sealant shall be UL 181B-M listed, UL 723 classified, NFPA 90A & 90B compliant, permanently flexible, nonflammable, and rated to 15" wg. Apply per manufacturer's recommendations. Contractors shall ensure no exposed sharp edges or burrs on ductwork.

(10) All angular turns shall be made with the radius of the center line of the duct equivalent to 1.5 times the width of the duct.

(11) Miscellaneous accessories such as test openings with covers, latches, hardware, locking devices, etc., shall be installed as recommended by SMACNA and/or as indicated. Test openings shall be placed at the inlet and discharge of all centrifugal fans, coils, VAV boxes, fan sections of air handling units, at the end and middle of all main trunk ducts and where indicated. All such openings shall be readily accessible without damage to finishes.

(12) Whether indicated or not, provide code approved, full sized fire dampers at all locations where ductwork penetrates fire rated walls. Fire stop rating shall meet or exceed the rating of the wall. Provide an approved access panel at each fire damper located and sized so as to allow hand reset of each fire dampers. All such fire dampers and access panels shall be readily accessible without damage to finishes. Refer to Architectural Plans for locations of fire rated walls. All access doors shall be 16"x16" or as high as ductwork permits and 16" in length.

(13) The Contractor who installs the sheet metal shall furnish to the Air Balancing Contractor, a qualified person to assist in testing and balancing the system.

(14) All fans and other vibrating equipment shall be suspended by independent vibration isolators.

(15) The interior surface of the ductwork connecting to return/exhaust air grilles shall be painted flat black. The ductwork shall be painted a minimum of 24" starting from the grille.

B. Materials (Low Pressure Single Wall)

(1) Ductwork, plenums, and other appurtenances shall be constructed of the following:

a. Steel sheets, zinc coated, Federal Specification 00-S-775, Type I, Class E & ASTM A93-59T with G-90 zinc coating or aluminum alloy sheets 3003, Federal Specification AA-A-359, Temper H-14. Utilize Aluminum in MRI Scan Rooms or NMR Room applications.

b. Exposed ductwork in finished spaces requiring insulation such as gymnasiums, etc., shall be dual wall ductwork.

(2) Ductwork, plenums, and other appurtenances shall be constructed of the materials of the minimum weights or gauges as required by the latest SMACNA 2" W.G. Standard or the below table, whichever is more stringent. When gauge thickness differs, the heavier gauge shall be selected. The below table shall serve as a minimum:

ROUND DUCT		RECTANGULAR DUCT	
DIA., INCHES	GAUGE	WIDTH, INCHES	GAUGE
3 TO 12	26	UP TO 12	26
12 TO 18	24	13 TO 30	24
19 TO 28	22	31 TO 54	22
29 TO 36	20	55 TO 84	20
37 TO 52	18	85 AND ABOVE	18

C. Materials (Low Pressure Double Wall Ductwork)

(1) Install Double Wall Ductwork in the following areas:

a. Gymnasium
b. Lobbies (where exposed)
c. Above areas with partial ceilings or clouds.
d. Anywhere supply ductwork is installed exposed to view in spaces (other than mechanical rooms)
e. At all other locations indicated on drawings.

(2) Furnish and install where indicated double wall duct. The double wall duct shall be Eastern Sheet Metal, United McGill, Semco or approved equivalent. The duct shall have an inner shell, a 1-inch layer of fiberglass insulation and an outer pressure shell.

(3) Ductwork outer shell shall be spiral, lock-seam construction fabricated from galvanized steel meeting ASTM-527 standard. Any ductwork exposed to view shall be constructed of G90 galvanized steel, 20 gauge, and shall be supported as required with aircraft cables and self-tightening locks for Medical Center projects ONLY. Aircraft cables supports are not acceptable for the Academic or Research Campus Buildings. Ductwork shall be constructed as specified in LOW PRESSURE DUCTWORK.

(4) Inner shell for spiral pipe shall be a perforated inner liner. The inner liner shall have 3/32" perforation with an overall open area of 23%.

(5) Inner shell for spiral pipe shall be solid galvanized steel and constructed of the minimum gauge specified with 3 intermediate reinforcing ribs.

(6) The fiberglass liner shall have a maximum thermal conductivity (k) factor of 0.27 btu per hour per square foot per degree Fahrenheit per inch thickness at 75-degree F ambient temperature.

(7) All double wall ductwork will be furnished with factory installed flanges equal to Eastern Sheet Metal Flange which shall consist of a 1.5 outer flange and an inner secondary flange which shall keep the inner flange concentric and eliminate inner wall connections. Flanges requiring inner couplings will not be allowed, no insulation shall be exposed to the airstream at the connections.

(8) All grille and register taps shall be factory manifolded. Field installed taps will not be allowed. Manifolded taps may be tack welded and caulked for appearance. Only taps for grilles and registers may be provided this way. All other fittings shall be full body welded.

D. Miscellaneous (Low Pressure)

(1) Un-insulated Flexible ductwork (Use Only Where Indicated)

a. Un-insulated flexible ductwork shall be corrugated aluminum. No sections shall be greater than five feet in length. Ductwork shall be UL rated and in accordance with IMC.

b. Flexible ductwork installed in a return or exhaust, or other negative static pressure application shall be rated for installation in negative pressure systems.

c. Provide Titus “FlexRight” or equal flexible duct bracing at each diffuser connection utilizing flexible ductwork.

(2) Insulated Flexible Duct (Use Only Where Indicated)

a. Owens/Corning or equivalent, 1 ½’’ inch thick fiberglass insulation; flexible liner; with aluminum pigment vinyl vapor barrier facing. Insulated flexible duct shall meet Fire Hazards Standards of NFPA 90A and IMC, flame spread not to exceed 25, smoke develop, and fuel contributed not to exceed 50 when tested in accordance with ASTM-E84. Minimum R-value of 6.0, tested in accordance with ASTM C177.71. Flexible duct may be used only for runouts and no sections shall be more than five feet in length.

b. When flexible duct is located in areas where it will be visible because the ceiling allows views to the ductwork above, the flexible duct shall be black. The black color shall be factory coloring and not field applied.

c. Flexible duct shall not be used in areas where there is no ceiling.

d. Flexible ductwork installed in a return or exhaust or other negative static pressure application shall be rated for installation in negative pressure systems

e. Provide Titus "FlexRight" or equal flexible duct bracing at each diffuser connection utilizing flexible ductwork.

(3) Insulated Flexible Duct – Steel or Aluminum (Use Only Where Indicated)

a. Flexible duct shall be a factory-fabricated assembly consisting of an all steel or aluminum material. Plastic with spiral wire flexible duct is not permitted.

b. All supply flexible duct shall be insulated with 1 ½ inch blanket of glass wool with an outer moisture barrier. The insulation assembly shall have a flame spread of not more than 25 and a smoke development rate of not over 50.

c. Flexible duct shall be rated for 10 inches W.G. static pressure.

d. A single length of flexible duct shall not exceed 4'0".

e. The minimum bend radius shall be 1 ½ times the duct diameter. The radius shall be measured to the inside edge of the flexible duct.

f. Total offset in any run of flexible duct shall not exceed 90 degrees.

g. Provide a minimum of one hanger of each run of flexible duct. The hanger must be strapped around the flexible duct and secured to the structure above. Hangers shall not be attached to other mechanical or electrical objects. Hangers may be attached to an approved trapeze. Ceiling grid shall not be used to fabricate a trapeze. Support hangers shall be installed horizontal. Screws shall not be used to penetrate the flexible duct to attach the hanger.

h. Flexible duct shall be secured to the rigid duct and appliance with a nylon adjustable, self-locking, strap and a minimum of three sheet metal screws. The flexible duct shall be sealed airtight at each connection with self-adhesive aluminum tape. Fiber or cloth duct tape is not permitted to seal rigid or flexible duct.

i. All flexible duct shall be pressure tested by a testing and balancing agency to ensure the installation is airtight.

(4) Flexible Connectors: Duro-Dyne, Ventfabrics, Inc., U.S. Rubber or equivalent; conforming to NFPA Pamphlet No. 90-A; neoprene coated glass fabric; 20 oz. for low pressure ducts secured with snap lock.

(5) Turning Vanes: Duro-Dyne or equivalent fabricated as recommended by SMACNA: noiseless when in place without mounting projections in ducts. All turning vanes shall be double blade type.

(6) Splitter Damper: Splitter damper shall be constructed of 16-gauge galvanized steel. Provide with operating hardware by Ventfabrics, Inc. to include damper blade bracket, ball joint bracket and operator shaft. Operator shall extend two inches from duct to allow for external insulation, where required. Regulator shall seal operator shaft air tight. Install hardware as recommended by manufacturer.

(7) Access Doors; In Ductwork: Flexmaster TBSM, Air Balance, Vent Products or equal. Access doors for rectangular ducts shall be 16"x16" where possible. Otherwise install as large an access door as height permits by 16" in length. Door shall be 1” thick double-wall insulated with continuous hinge and cam lock. Provide in ducts where indicated or where required for servicing equipment whether indicated or not. Provide a hinged access door in duct adjacent to all fire, smoke and control dampers for the purpose of determining position. Access doors shall also be provided on each side of duct coils (water, electric, steam, etc.) and downstream side of VAV boxes and CAV boxes.

(8) Architectural Access Doors in Ceilings or Walls: Provide where required to access equipment, dampers, valves, filters, etc. Provide Kees D Panel, Cesco, Milcor or equal. Panels shall be 24”x24” in size and constructed with 16 gauge galvannealed steel for door and frame. In finished areas, provide with primed steel with 1” border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1” border. Door shall include three (3) screwdriver operated cam latches and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors. For fire rated units, provide manufacturer’s standard insulated flush panel/doors with continuous piano hinge and self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(9) Security Architectural Access Doors in Walls: Provide where required to access equipment, dampers, valves, filters, etc.Provide Kees SSAP Panel, Cesco, Milcor or equal. Panels shall be 24”x24” in size and constructed with 12-gauge steel for door and frame. In finished areas, provide with primed steel with 1” border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1” border. Door shall include key-operated cylinder dead bolt lock (coordinate cylinders and keys with Owner to match facility standards) and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors and straps. For fire rated units, provide manufacturer’s standard insulated flush panel/doors with continuous piano hinge and

self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(10) Volume Dampers (Rectangular): Ruskin, Model MD35 or Empco, Air Balance; Louvers and Dampers, Titus, Carnes, Cesco/Advanced Air, Creative Metals, United Air, Pottorf rectangular volume dampers. Frames shall be 4" x 1 "x 16-gauge galvanized steel. Blades shall be opposed blade 16-gauge galvanized steel with triple crimped blades on 6" centers. Linkage shall be concealed in jamb. Bearings shall be ½" nylon. Maximum single section size shall be 48" wide and 72" high. Provide with Ventfabrics 2" high elevated dial regulator to avoid damper handle from conflicting with duct insulation. Provide permanent mark on dial regulator to mark air balance point.

(11) Volume Dampers (Round): Ruskin, Model MDRS25 or, Empco, Air Balance; Louvers and Dampers, Titus, Carnes, Cesco/Advanced Air, Creative Metals, United Air, Pottorff round volume dampers. Dampers shall be butterfly type consisting of circular blade mounted to axle. Frames shall be 20-gauge steel, 6" long. Damper blades shall be 20-gauge galvanized steel. Axle shall be 3/8"x6" square plated steel. Bearing shall be 3/8" nylon. Provide with Ventfabrics 2" high elevated dial regulator to avoid damper handle from conflicting with duct insulation. Provide permanent mark on dial regulator to mark air balance point.

(12) Fire Dampers: Fire dampers shall comply with IMC and shall be constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have a 1-1/2 or 3-hour fire protection rating as required by fire wall. Damper shall have a 165°F fusible link, and shall include a UL label in accordance with established UL labeling procedures. Fire damper shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing 16-gauge minimum steel sleeves, angles, other materials, practices required to provide an installation equipment to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. All fire dampers shall be dynamic. Static fire dampers are not allowed. Provide velocity level and pressure level as required for application (if in doubt, contact Engineer). Fire dampers shall be Ruskin Type DIBD for 1-1/2-hour rating or Ruskin Type DIBD 23 for a 3-hour rating. Other acceptable manufacturers are Air Balance, Prefco, Greenheck, Nailor, or Safe Air. Provide an access door for fire damper reset at all fire damper locations.

(13) Motor Driven Smoke Dampers – Air Foil Blade: Provide Ruskin SD60 smoke damper where required by the locations of smoke partitions or as shown on the plans, whichever is more stringent. Other acceptable manufacturers are Air Balance or Pottorff. All smoke dampers shall be three inches larger than HVAC duct in each direction. Frame shall be a minimum of 18-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Each

smoke damper shall be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems under the latest version of UL555S, and bear a UL label attesting to same. As part of the UL qualification, dampers shall have demonstrated a capacity to operate (to open and close under HVAC system operating conditions) with pressures of at least the maximum possible of the HVAC system in the closed position, and the system maximum duct air velocity in the open position. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Actuator to be mounted outside of air stream. The pressure drop shall not be greater than .16" wg @ 2500 FPM when tested by an independent laboratory. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements.

(14) Motor Driven Fire/Smoke Dampers – Air Foil Blade: Fire damper shall be constructed and tested in accordance with UL Safety Standard 555. The damper shall be Ruskin FSD60. Other acceptable manufacturers are Air Balance or Pottorff. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Frame is to be a minimum of 16-gauge galvanized steel, rollformed into a structural hat shape channel. Frame seals shall consist of flexible, compression type stainless steel. The damper and actuator electric shall be rated to an elevated temperature or 250 degrees F or 350 degrees F. In addition, the damper must be factory supplied with actuator and sleeve to comply with the requirements of UL 555S. These dampers shall have been constructed and tested in compliance with U.L. Standard 555 and U.L. Standard 555S, current editions. The pressure drop shall not be greater than .25 in.wg. At 2500 fpm when tested by an independent laboratory. Each damper shall bear an approved U.L. label identifying its classification as a Dynamic Rated Fire Damper (Static Rated dampers are not acceptable), and shall further be classified by U.L. as a Leakage Rated Damper for use in Smoke Control Systems. Each damper shall have a 1-1/2-hour fire protection rating, 212EF U.L. Listed fusible link and a leakage class I. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Provide factory supplied caulked sleeve, 20 gauge on dampers through 84” wide and 18 gauge above 84" wide. Actuator to be mounted outside of air stream. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements.

(15) Motor Driven Control Dampers – Provide Ruskin Model CD50 air foil damper as shown on the plans. Frame shall be a minimum of 16-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, 6 inches wide. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Blade seals shall be equal to Ruskinprene. Leakage Rating shall be Pressure/Class 1.

3. MEDIUM PRESSURE DUCTWORK

A. General (Medium Pressure)

(1) All ductwork connections, fittings, joints, etc., shall be sealed. Seal with high velocity, smooth-textured, water based duct sealant. Sealant shall be UL 181B-M listed, UL 723 classified, NFPA 90A & 90B compliant, permanently flexible, non-flammable, and rated to 15” wg. Apply per manufacturer's recommendations.

(2) Ductwork shall be installed per SMACNA Medium or High-Pressure Manual, whichever is applicable. (Latest Edition shall apply.)

(3) All hanger straps shall be 18 ga. minimum with reinforcement angles installed in strict accordance with SMACNA. Flat oval ducts shall be installed with 2"x2"x1/4" angles on top and bottom ducts 18" wide and larger. Use 1"x1"x3/16" angles on ducts under 18" wide.

(4) Miscellaneous accessories such as test openings with covers, latches, hardware, locking devices, etc., shall be installed as recommended by SMACNA or the duct manufacturer, and/or as indicated. Test openings shall be placed at the discharge of all air handling units and at the end and middle of all main trunk ducts and where indicated. All such openings shall be readily accessible without damage to finishes.

(5) Whether indicated or not, provide code approved, full sized fire dampers at all locations where ductwork penetrates fire rated walls. Fire stop rating shall meet or exceed the rating of the wall. Provide an approved access panels at each fire damper located and sized so as to allow hand reset of each fire damper. All such fire dampers and access panels shall be readily accessible without damage to finishes. Refer to Architectural Plans for locations of fire rated walls. Where access doors are installed in insulated ductwork, the access door shall be the insulated type.

B. Materials (Medium Pressure Single Wall)

(1) All round, rectangular, and oval medium pressure ductwork for systems above 1.5” W.G. shall be Eastern Sheet Metal, United McGill or Semco or equal with construction as required by the latest SMACNA Standard (Refer to required pressure rating of the duct system as outlined in the Duct Schedule of this spec section).

(2) Any ductwork exposed to view shall be double wall and constructed of galvanized steel. Galvanized metal shall be prepped and clean prior to painting. Coordinate with General Contractor.

Ductwork shall be spiral, lock-seam construction fabricated from galvanized steel meeting ASTM-527 standard. Ductwork shall be constructed of materials of the minimum weights or gauges as required by the latest SMACNA Standard (Refer to required pressure rating of the duct system as outlined in the Duct Schedule of this spec

section) or the below table. When gauge thickness differs, the heavier gauge shall be selected. The below table shall serve as a minimum:

	ROUND DUCT (or Equivalent Round Diameter for Oval Ducts)	RECTANGULAR DUCT	
DIA., INCHES	GAUGE	WIDTH, INCHES	GAUGE
3 TO 14	26	UP TO 12	26
15 TO 26	24	13 TO 30	24
27 TO 36	22	31 TO 54	22
37 TO 50	20	55 TO 84	20
52 TO 60	18	85 AND ABOVE	18

(3) All medium pressure duct fittings shall be fabricated by the same manufacturer as the spiral pipe. Contractor or field fabricated fittings shall not be accepted. Duct fittings shall be constructed per the latest SMACNA standard (Refer to required pressure rating of the duct system as outlined in the Duct Schedule of this spec section) with continuous welds. Take-off fittings shall be combination type tees (Eastern Sheet Metal Model “CB” or equal). Straight or angle tees are not acceptable. Fittings shall be constructed of the following minimum gauges:

	ROUND DUCT (or Equivalent Round Diameter for Oval Ducts)	RECTANGULAR DUCT	
DIA., INCHES	GAUGE	WIDTH, INCHES	GAUGE
3 TO 50	20	UP TO 36	20
51 TO 60	18	37 TO 60	18
61 TO 84	16	61 AND ABOVE	16

(4) All single wall ductwork will be furnished with factory installed flanges equal to Eastern Sheet Metal Flange on all ductwork greater than 24 inches in size.

C. Materials (Medium pressure Double Wall)

(1) Furnish and install where indicated by drawings or specifications medium pressure double wall duct. The double wall duct shall be United McGill Acoustic K27, SEMCO,

Dixie or approved equivalent. The duct shall have a [perforated inner liner. The inner liner shall have 3/32" perforation with an overall open area of 23%.] [solid galvanized steel inner liner], an intermediate layer of fiberglass insulation minimum 1'' thick and an outer pressure shell. Duct shall be of spiral lock seam construction fabricated from galvanized steel meeting ASTM-A527 standard. The duct insulation shall have minimum R-value of 6.0. Medium pressure double wall fittings shall have the same construction features as the double wall duct. Duct shall be constructed of G90 Galvanized steel. Outer shell of ductwork shall be constructed of the minimum gauges specified above for single wall medium pressure ductwork.

(2) All double wall ductwork will be furnished with factory installed flanges equal to Eastern Sheet Metal Flange which shall consist of a 1.5 outer flange and an inner secondary flange which shall keep the inner flange concentric and eliminate inner wall connections. Flanges requiring inner couplings will not be allowed, no insulation shall be exposed to the airstream at the connections.

D. Miscellaneous (Medium pressure)

(1) Flexible Connectors: Duro-Dyne, Ventfabrics, U.S. Rubber or equivalent; conforming to NFPA Pamphlet No. 90-A or IMC, whichever is more stringent; neoprene coated glass fabric; 30 oz. for medium pressure ducts secured with bolted angles. Provide flexible connectors at inlet and outlet of air handling equipment to accommodate a minimum of three times the operating pressure of the system.

(2) Architectural Access Doors In Ceilings or Walls: Provide where required to access equipment, dampers, valves, filters, etc. Provide Kees D Panel, Cesco, Milcor or equal. Panels shall be 24"x24" in size and constructed with 16 gauge galvannealed steel for door and frame. In finished areas, provide with primed steel with 1" border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1" border. Door shall include three (3) screwdriver operated cam latches and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors. For fire rated units, provide manufacturer's standard insulated flush panel/doors with continuous piano hinge and self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(3) Security Architectural Access Doors in Walls: Provide where required to access equipment, dampers, valves, filters, etc. Provide Kees SSAP Panel, Cesco, Milcor or equal. Panels shall be 24"x24" in size and constructed with 12-gauge steel for door and frame. In finished areas, provide with primed steel with 1" border to accept architectural specified finish. In Mechanical, Electrical, or service spaces, provide brushed satin finish with 1" border. Door shall include key-operated cylinder dead bolt lock (coordinate cylinders and keys with Owner to match facility standards) and concealed continuous pivoting rod hinge. Door shall open 175 degrees. For masonry construction, furnish frames with adjustable metal masonry anchors and straps. For fire rated units, provide manufacturer's standard insulated flush panel/doors with continuous piano hinge and

self-closing mechanism. The Contractor shall include all required access doors in the bid and shall coordinate with the General Contractor prior to the bid to ensure a complete project.

(4) Fire Dampers: Fire dampers shall comply with IMC and shall be constructed and tested in accordance with UL Safety Standard 555. Each fire damper shall have a 1-1/2 or 3-hour fire protection rating as required by fire wall. Damper shall have a 165°F fusible link, and shall include a UL label in accordance with established UL labeling procedures. Fire damper shall be equipped for vertical or horizontal installation as required by the location shown. Fire dampers shall be installed in wall and floor openings utilizing 16-gauge minimum steel sleeves, angles, other materials, practices required to provide an installation equipment to that utilized by the manufacturer when dampers were tested at UL. Installation shall be in accordance with the damper manufacturer's instructions. All fire dampers shall be dynamic. Static fire dampers are not allowed. Provide velocity level and pressure level as required for application (if in doubt, contact Engineer). Fire dampers shall be Ruskin Type DIBD for 1-1/2-hour rating or Ruskin Type DIBD 23 for a 3-hour rating. Other acceptable manufacturers are Air Balance, Prefco, Greenheck, Nailor, or Safe Air. Provide an access door for fire damper reset at all fire damper locations.

(5) Motor Driven Smoke Dampers – Air Foil Blade: Provide Ruskin SD60 smoke damper where required by the locations of smoke partitions or as shown on the plans, whichever is more stringent. Other acceptable manufacturers are Air Balance or Pottorff. Frame shall be a minimum of 18-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Each smoke damper shall be classified by Underwriters Laboratories as a Leakage Rated Damper for use in smoke control systems under the latest version of UL555S, and bear a UL label attesting to same. As part of the UL qualification, dampers shall have demonstrated a capacity to operate (to open and close under HVAC system operating conditions) with pressures of at least the maximum possible of the HVAC system in the closed position, and the system maximum duct air velocity in the open position. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Actuator to be mounted outside of air stream. The pressure drop shall not be greater than .16" wg @ 2500 FPM when tested by an independent laboratory. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements.

(6) Motor Driven Fire/Smoke Dampers – Air Foil Blade: Fire damper shall be constructed and tested in accordance with UL Safety Standard 555. The damper shall be Ruskin FSD60. Other acceptable manufacturers are Air Balance or Pottorff. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, on 6" maximum centers. Frame is to be a minimum of 16-gauge galvanized

steel, rollformed into a structural hat shape channel. Frame seals shall consist of flexible, compression type stainless steel. The damper and actuator electric shall be rated to an elevated temperature or 250 degrees F or 350 degrees F. In addition, the damper must be factory supplied with actuator and sleeve to comply with the requirements of UL 555S. These dampers shall have been constructed and tested in compliance with U.L. Standard 555 and U.L. Standard 555S, current editions. The pressure drop shall not be greater than .25 in.wg. At 2500 fpm when tested by an independent laboratory. Each damper shall bear an approved U.L. label identifying its classification as a Dynamic Rated Fire Damper (Static Rated dampers are not acceptable), and shall further be classified by U.L. as a Leakage Rated Damper for use in Smoke Control Systems. Each damper shall have a 1-1/2-hour fire protection rating, 212EF U.L. Listed fusible link and a leakage class I. In addition to the leakage ratings already specified herein, the dampers and their actuators shall be qualified under UL555S to an elevated temperature of 350 degrees F. Appropriate electric actuators shall be installed by the damper manufacturer. Refer to building fire alarm and controls for exact type. Provide factory supplied caulked sleeve, 20 gauge on dampers through 84" wide and 18 gauge above 84" wide. Actuator to be mounted outside of air stream. Provide factory supplied caulked sleeve, gauge as required to meet manufacturer UL installation requirements

(7) Motor Driven Control Dampers – Provide Ruskin Model CD60 air foil damper as shown on the plans. Frame shall be a minimum of 16-gauge galvanized steel formed into a structural hat channel shaper with tabbed corners for reinforcement. The blade shall be airfoil shaped, constructed of a dual skinned galvanized steel, 14-gauge equivalent thickness, 6 inches wide. Bearings shall be stainless steel sleeve turning in an extruded hole in the frame. Jamb seal shall be stainless steel flexible metal compression type. Blade seals shall be equal to Ruskinprene. Leakage Rating shall be Pressure/Class 1.

(8) Access Doors; In Rectangular Medium Pressure Ductwork: Flexmaster TBSM, Air Balance, Vent Products or equal. Access doors for rectangular ducts shall be 16"x16" where possible. Otherwise install as large an access door as height permits by 16" in length. Door shall be 1" thick double-wall insulated with continuous hinge and cam lock. Provide in ducts where indicated or where required for servicing equipment whether indicated or not. Provide a hinged access door in duct adjacent to all fire, smoke and control dampers for the purpose of determining position.

(9) Access Doors; In Round or Oval Medium Pressure Ductwork: All access doors in round or oval medium pressure ductwork shall be screw and gasketed type. Screws shall be maximum 4 inches on centers. Access door sizes shall be as follows:

DUCT DIAMETER	OPENING SIZE
3-4 inches	4" x 10"
5-6 inches	6" x 10"
7-24 inches	10" x 16"
26-36 inches	16" x 16"
Over 36 inches	16" x 22"

(10) Pressure Relief Doors: [Designer edit if required] Provide a pressure relief vent in the supply air ductwork at each air handling unit. It shall be located between the fan outlet and the first manual or automatic (i.e., fire, fire smoke, or any motorized) damper or closure device. It shall be sized to relieve the duct air pressure below the rated pressure construction of the ductwork and above the working pressure of the fan. The supply air relief door shall be Ruskin PRD18 or equal. Provide a vacuum relief vent in the return and/or outside air ductwork at each air handling unit. It shall be located between the air handling unit casing and the first manual or automatic damper or closure device. It shall be sized to relieve the duct vacuum below the rated construction of the ductwork and above the working negative pressure of the fan. The return air relief door shall be Ruskin NRD18 or equal. Automatic fan shutdown upon damper closure shall not be an acceptable protection for either overpressure or vacuum conditions. All duct pressure relief doors shall be of the automatic resetting type unless otherwise noted.

4. WATER HEATER AND BOILER FLUE STACKS

A. Location

(1) All flues shall be offset to provide, whether indicated or not, a minimum of 10' horizontal separation to any air intake. This distance shall be a 25' minimum on healthcare facilities.

B. Natural Draft, Gas-Fired Water Heaters and Boilers (Maximum Flue Temperature 300°F., Maximum Size 8 Inches Diameter)

(1) Metal Fab Type M, or approved equivalent Type "B" gas vent system. Gas Vent shall be double wall construction, with inner wall constructed of aluminum and outer wall constructed of galvanized steel. Gas vent system shall be UL listed and installed in strict accordance with the manufacturers recommendations. Provide with factory fittings such as elbows, tees, increasers, draft hood connections, tall cone flashing, storm collar, wall thimble, metal cap, etc., as required for a complete project. Minimum UL listed clearance to combustibles shall be one inch.

C. Natural Draft, Gas-Fired Water Heaters and Boilers (Maximum Flue Temperature 400°F; 10 Inch Diameter and Greater in Size)

(1) Metal Fab Type M, or approved equivalent Type "B" gas vent system. Gas vent shall be double wall construction. Inner wall shall be aluminum and outer wall galvanized steel. One-half inch insulating air space shall be provided between the walls. Gas vent system shall be UL listed and installed in strict accordance with the manufacturer's recommendations. Provide with factory fittings such as elbows, tees, tee cap, cap, tall cone flashing, support plate increaser etc., as required for a complete project. Shop drawings shall be submitted for Engineer's review. Minimum UL listed clearance to combustibles shall be one inch.

D. Gas-Fired Water Heaters and Boilers with Barometric Damper or Number 2 Fuel Oil-Fired Water Heaters and Boilers (Maximum Flue Temperature 1000°F)

(1) AMPCO Model "NPS", or approved equivalent double wall negative pressure system. Vent shall be double wall construction. Inner wall shall be Type 304 stainless steel. Outer wall shall be aluminum coated steel. One-half inch insulating air space shall be provided between walls. Minimum UL listed clearance to combustibles shall be twelve inches. Provide vent spaces as required, vent system shall be UL listed in strict accordance with the manufacturer's recommendations. Provide with factory fittings such as elbows, tees, tee cap, cap, tall cone flashing, support plate, increaser, etc., as required for a complete project. Shop drawings shall be submitted for Engineer's review.

E. Positive Pressure vent systems for Water Heaters and Boilers, Gas-Fired or Oil-Fired (Maximum Flue Temperature 1000°F)

(1) Metal Fan PIC or approved equivalent double wall positive pressure system. Vent shall be double wall construction. Inner wall shall be 20-gauge, Type 304 stainless steel. Outer wall shall be 24-gauge aluminum coated steel. One-inch insulating air space shall be provided between walls. Minimum UL listed clearance to combustibles shall be ten inches. Provide vent spacers as required. Vent system shall be UL listed in strict accordance with the manufacturer's recommendations. Provide with factory fittings such as elbows, tees, tee cap, cap, tall cone flashing, support plate, increaser, etc., as required for a complete project. Shop drawings shall be submitted for Engineer's review.

F. Category II and Category IV Appliances (Positive and Negative Pressure Condensing Appliances)

(1) Metal-Fab Corr/Guard, Heat-Fab Saf-T Vent or other approved equal meeting the specification below:

The vent shall be of the double wall, factory-built type for use on condensing appliances or pressurized venting systems serving Category II, III, or IV appliances or as specified by the equipment manufacturer.

Maximum temperature shall not exceed 550°F.

Vent shall be listed for an internal static pressure of 6” w.g. and tested to 15” w.g.

Vent shall be constructed on an inner and outer wall with a 1” annular insulating air space.

The inner wall (vent) shall be constructed of AL29-4C superferritic stainless steel, .015 thickness for 6”-12” diameters and .024 thickness for 14”-24” diameters.

The outer wall (casing) shall be constructed of type 304 stainless steel. .018 thickness for 6”-12” diameters and .024 thickness for 14”-24” diameters.

Inner and outer walls shall be connected by means of spacer clips that maintain the concentricity of the annular space and allow unobstructed differential thermal expansion of the inner and outer walls.

Product shall carry the appropriate UL listing mark or label.

6” to 12” diameter vent shall have 1” clearance to combustibles at 550°F. 14” to 24” diameter vent shall have 5” clearance to combustibles at 550°F.

5. FLUE CAPS

A. Provide a flue cap on all flues. It shall be similar to the Breident positive downdraft eliminator style.

6. DUCT SCHEDULE

A. Supply Ducts:

(1) Ducts Connected to Constant-Volume Air-Handling Units RTU-1/2:

a. Pressure Class: Positive 2-inch wg Refer to Low Pressure requirements as outlined in section 2 of this spec.
b. Minimum SMACNA Seal Class: C
c. SMACNA Leakage Class for Rectangular: 24
d. SMACNA Leakage Class for Round and Flat Oval: 12

B. Return Ducts:

(1) Ducts Connected to Air-Handling Units:

a. Pressure Class: Negative 2-inch wg Refer to Low Pressure requirements as outlined in section 2 of this spec
b. Minimum SMACNA Seal Class: C
c. SMACNA Leakage Class for Rectangular: 24
d. SMACNA Leakage Class for Round and Flat Oval: 12

C. Exhaust/Relief Ducts:

(1) Ducts Connected to Exhaust Fans:

a. Pressure Class: Negative 2-inch wg Refer to Low Pressure requirements as outlined in section 2 of this spec
b. Minimum SMACNA Seal Class: C
c. SMACNA Leakage Class for Rectangular: 24

d. SMACNA Leakage Class for Round and Flat Oval: 12

12. Air Leakage Testing of the Ductwork Systems

A. It is the intent of this section to ensure the ductwork installed has minimal air leakage.

B. Air leakage testing shall be accomplished by an AABC or NEBB certified company. Refer to the Test & Balance specifications.

C. It is the intent to test all ductwork. The duct systems which will require testing are as follows:

(1) All supply air duct systems

(2) All return air duct systems.

(3) All exhaust air duct systems.

D. Do not insulate the supply air systems prior to testing.

E. The maximum allowable air leakage rate for each system tested must conform to SMACNA required leakage class rating as specified in section 11, DUCT SCHEDULE, of this spec.

F. The entire supply air ductwork system shall be tested.

G. All return and exhaust air sheet metal ductwork associated with the system shall be tested. Flexible ductwork shall not be tested. Cap the main duct prior to the central equipment fan connection. Also cap the branch ducts which serve the diffusers, after the round branch air volume with sheet metal caps. Seal caps well to damper to avoid air loss at this location. This air loss, from the caps, is included in the noted leakage rate.

H. The noted allowable leakage rate is the total allowable. It shall include leakage associated with the following:

(1) All ductwork as described in above paragraphs.

(2) Access doors

(3) Volume dampers

(4) Relief air doors

(5) Smoke dampers

(6) Fire dampers

(7) Fire smoke dampers

(8) End caps used to seal ducts

I. If any duct system fails a test, the contractor shall reseal the system. It shall then be retested until the duct system meets the leakage allowable at no additional cost to the owner.

J. Carefully select the ductwork construction requirements and the type of duct sealant to be used as required to meet the leakage allowances. The sheet metal duct pressure classification is a minimum only. The contractor shall select the appropriate sheet metal pressure classification, duct sealant class and duct sealant materials to meet the project air leakage allowances.

K. A duct pre-installation conference shall be held prior to the installation of the ductwork. Present should be the owner's representative, engineer, Test & Balance Contractor, General Contractor, Mechanical Contractor, Sheet Metal Contractor, Insulation Contractor and the manufacturer's representative of the duct sealant to be used. At this meeting, the contractor shall advise all of the duct materials and sealant materials to be used to meet the air leakage allowances.

L. Whenever the systems are being leak tested by the Test & Balance Contractor, a representative from the Mechanical Contractor shall be present to assist.

END OF SECTION 23 12 00

SECTION 25 01 00 - MOTOR STARTERS AND OTHER ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

1. MOTOR STARTERS-GENERAL

   A. Where motor starters are required for mechanical equipment they are to be the responsibility of the Contractor furnishing the equipment as outlined herein.

   B. Motor starters shall be furnished by the Equipment Supplier with their equipment. Coordinate all requirements for starters with equipment suppliers and other trades.

   C. Motor starters shall be NEMA style. I.E.C.-style starters are not to be provided. Their sizing and installation shall be coordinated with the equipment manufacturer's requirements and in accordance with the National Electrical Code.

   D. Unless otherwise noted, provide combination starter/disconnects for all equipment requiring a starter.

2. ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT

   A. All mechanical equipment shall be provided for single point electrical connection unless specifically noted to the contrary. Refer to schedules and other sections of these specifications for further requirements. It is the responsibility of the Contractor to coordinate the electrical characteristics of all equipment with the electrical provisions indicated on the Contract Documents. The Contractor shall notify the Engineer in writing ten calendar days prior to bid of any discrepancy so a written clarification by Addendum may be made. If such notice is not given, the Contractor shall be responsible for any and all costs or delays associated with any changes required. Specification of equipment characteristics made during review of shop drawings shall not relieve the Contractor of this responsibility.

   B. The equipment manufacturer shall provide internally mounted fuses with their equipment, as required, to comply with the U.L. listing on the equipment name plate. (i.e., hermetically sealed compressors or equipment with name plate data that recommends or requires fuse protection.) See also, National Electrical Code, Article 440, and other applicable sections of the N.E.C.

   C. It is the Contractor's responsibility to furnish and install fusible or non-fusible disconnect switches or circuit breakers for disconnecting means as required by the Code for <u>all</u> electrically powered equipment. All power wiring from source, thru disconnecting means and motor starters to motor terminals or equipment junction box is to be furnished and installed by the Contractor. Each separate contractor engaged for the project shall coordinate with all other trades to ensure all necessary equipment and labor is included for fully functioning mechanical systems, installed per code requirements. Unless otherwise notes, provide combination starter/disconnects for all equipment requiring a starter.

D. Final electrical connection of equipment shall be verified for proper voltage requirements in conjunction with the motor nameplate patch and actual wiring configuration. Any costs associated with damage to appliances motors, equipment, etc., connected to incorrect supply voltage shall be borne by the Contractor.

E. Refrigeration condensing units with internal compressors shall be furnished with integral starter. The Contractor is to furnish and install a fusible disconnecting means with fuses sized to motor nameplate requirements. Coordinate wiring, mounting and style of disconnect switch at unit in field.

F. All interlock or other control wiring, unless specifically noted otherwise, is the responsibility of the Contractor.

G. All equipment shall be suitably enclosed. All enclosures for equipment shall be rated and approved for the environment in which it operates. (i.e., NEMA 1, NEMA 3R, NEMA 7, NEMA 12, etc.) Verify the requirement with the installation condition if not indicated on the plans.

H. Observe the following standards for manufacturers of equipment and selection of components.

(1) Starters, control devices and assemblies: NEMA, U.L. - (I.E.C. style not acceptable)

(2) Enclosures for electrical equipment: NEMA, U.L.

(3) Enclosed switches: NEMA, U.L.

(4) All electrical work, generally: National Electrical Code

(5) All electrical work in industrial occupancies: J.I.C. standards

(6) All electrical components and materials: U.L. listing required.

I. Where required, the Contractor is to provide mounting rails or channels to install starters with code-required clearances. Framing shall be solidly anchored by welding expansion shields in masonry or other approved anchorage. Frames are to be constructed of steel angles or pre-manufactured channel systems such as Unistrut, Kindorf or B-Line Company. Framing material shall be pre-finished with corrosion-resistant material or painted with two coats corrosion-resistant oil-based enamel.

3. REQUIREMENTS FOR MECHANICAL EQUIPMENT, 1/2 H.P OR LESS

A. This section describes requirements for small mechanical equipment such as (but not limited to) package terminal heating/cooling units, (water source heat pumps, etc.) VAV boxes, unit heaters, vertical and horizontal unit ventilators, exhaust fans, in-line fans, fan coil units, cabinet heaters and the like.

B. Small equipment with motor(s) of 1/2 H.P., single phase or less are generally not required to be furnished with NEMA-style starter(s), unless otherwise noted.

C. For such equipment, provide integral contactor or horsepower-rated relay where controlled by thermostat or other type of switch. Contactors or relays shall be as recommended by the manufacturer of the equipment, suitable for the service duty.

D. Provide transformer within unit as required to derive low voltage A.C. for thermostat control or derive from temperature controls panel, if available.

E. Provide internal fusing for unit motor and other loads in fuse block or in-line fuseholder. See also Article 2-B, this Section.

F. Where externally-mounted disconnecting means is required and would be impractical, unsightly or inappropriate in the judgment of the Engineer, disconnects shall be located within the unit. These disconnects may be fusible H.P.-rated snap switches or manual starters with overload elements, as required. Locate this and other electrical equipment within enclosure where easily accessible behind access panel or door on unit, and as acceptable to the electrical inspector or local authority having jurisdiction. Refer to mechanical equipment schedules for further information.

G. Where fractional horsepower duplex pumps such as water circulators, sump pumps, etc. are provided, they shall be provided with alternators, cordsets, etc., as required for a complete installation.

4. REQUIREMENTS FOR MECHANICAL EQUIPMENT, 3/4 H.P. OR LARGER

A. This section describes requirements for mechanical equipment such as (but not limited to) exhaust fans, larger air handling units, cooling tower fans, water source heat pumps, chilled or hot water pumps, D.X. roof-top units, air compressors and the like.

B. Provide premium efficiency motors.

C. Equipment provided with motor(s) of 3/4 H.P. and larger, single or three-phase are required to be furnished with starters suitable for the load(s) specified. It is recommended that starters be furnished integrally with or mounted on equipment for field wiring by the Contractor. Where starters are furnished separate from equipment, furnish templates or rough-in diagrams to the appropriate contractor for their use in installation.

D. All starters shall be size 0 minimum. They shall be constructed and tested in accord with latest edition of NEMA standards. All starters shall be across-the-line magnetic type, unless indicated otherwise. On motors of 20 H.P. or greater rating, the supplier shall provide starters capable of limiting inrush currents. These shall be of the wye-delta, reduced voltage open-transition type, or electronic controlled, as required. Do not utilize closed transition starters unless specifically indicated.

E. Magnetic starters shall be furnished with the following characteristics and accessories as a minimum. See other sections of these specifications and mechanical schedules for further requirements.

(1) Contacts shall be silver-alloy, double-break type. Contacts shall be replaceable without removal of wiring or removal of starter from enclosure. Number of contacts shall be as required for service indicated. Contacts shall be gravity dropout type, positive operation.

(2) Coil voltage shall be 120 volts, A.C., 60 HZ or less, as required to suit control systems available voltages. Coils shall be of molded construction, rated for continuous duty. Provide coil clearing contact as required.

(3) Provide control transformer of adequate K.V.A. as required on all starters with line-to-line voltages higher than 120 volts A.C. Provide fuse block and slow-blow fuse to protect control transformer per NEMA, N.E.C. and U.L.

(4) Provide hand-off-auto selector switch in face of starter, wired into hand and off switch positions. Auto position (if needed) to be field wired as indicated on plans or schedules for automatic control. Provide a green run pilot light.

(5) Provide NEMA Class 20 resettable overload relays, accurately sized to the motor nameplate rating of the motor served and the temperature differential between motor and controller. Overloads shall be easily replaceable, and resettable without opening enclosure, via a push button or similar means. Class 10 or Class 30 overloads may be used, depending on the type of anticipated service.

(6) Provide at least one N.O. and one N.C. auxiliary contact (field-convertible to opposite operation) with each starter. Refer to mechanical details or schedules for additional requirements, if any. All starters shall have space for two additional single-pole contacts.

(7) All starters shall be thru-wiring type.

(8) Provide phase failure sensing relay to open starter coil circuit (on loss of one or more phases) on all three-phase starters controlling motors of 15 H.P. or larger.

(9) Provide power factor correction capacitors on motors of 15 H.P. or larger where predicted power factor based on manufacturer's data will fall below 0.90%. Capacitors shall be of the unit-cell type, in single enclosure with discharge resistors and tank overpressure circuit interrupter for safety.

5. REQUIREMENTS FOR WIRING

A. All wiring, including controls, interlock, miscellaneous power, sensors, thermostats, etc., shall be installed in metallic raceway systems that are in compliance with all Division 26 requirements of these Specifications, unless specifically noted otherwise. Open cabling

systems will only be permitted where specifically permitted within the Division 26 Specifications and if less than 50 volts A.C. peak-to-peak or 50 volts maximum D.C.

B. Where open cabling is permitted, it shall be installed with proper support as specified in the Division 26 Specifications.

C. Where open cabling is permitted, and installed in environmental air plenum (return, relief, supply, etc.), the materials installed shall be in compliance with N.E.C. Articles 700, 725, 770 (for fiber optic), 780 and 800.

D. Where open cabling is permitted, it shall only be installed open in accessible spaces. Where concealed in walls, it shall be routed through raceways to outlet box(es) for the terminal device.

6. INVERTER DUTY MOTORS

A. Motors which are controlled by variable frequency drive shall be:

(1) NEMA MG-1 Part 31 rated for Inverter Duty.

(2) Furnished with shaft grounding kit for all motors:

a. Motors less than 100 HP in size shall be furnished with shaft grounding kit, Aegis SGR Bearing Protection Ring or equal. One shaft grounding ring and related hardware shall be provided on drive end or non-drive end of motor per manufacturer's instructions. These shall be factory mounted and installed on the exterior of the motor to allow for visual inspection. Ground motor frame per manufacturer's instructions. Install kit in strict accordance with manufacturer's instructions.

b. Motors Pumps greater than 100 HP to 1000 HP in size shall be furnished with shaft grounding kit, Aegis SGR Bearing Protection Ring or equal. Provide shaft grounding ring on drive end and non-drive end of motor per manufacturer's instructions. Additionally, provide insulated bearing journals to further reduce risk of current dissipation through bearings. Ground motor frame per manufacturer's instructions. Install kit in strict accordance with manufacturer's instructions.

END OF SECTION 25 01 00

SECTION 26 05 01 - GENERAL PROVISIONS - ELECTRICAL

1. GENERAL

A. The Instructions to Bidders, General and Special Conditions, and all other contract documents shall apply to the Contractor's work as well as to each of his Sub Contractor's work. Each Contractor is directed to familiarize himself in detail with all documents pertinent to this Contract. In case of conflict between these General Provisions and the General and/or Special Conditions, the affected Contractor shall contact the Engineer for clarification and final determination.

B. The Contractor shall be governed by any alternates, unit prices and Addenda or other contract documents insofar as they may affect his part of the work.

C. The work included in this division consists of the furnishing of all labor, equipment, transportation, supplies, material and appurtenances and performing all operations necessary for the satisfactory installation of complete and operating electrical systems indicated on the drawings and/or specified herein.

D. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the electrical systems in a substantial manner, in compliance with the requirements stated, implied, or intended in the drawings and specifications, shall be included as part of this Contract. The Contractor shall give written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of work omitted a minimum of ten days prior to bid. In the absence of such written notice and by the act of submitting his bid, it shall be understood that the Contractor has included the cost of all required items in his bid, and that he will be responsible for the approved satisfactory functioning of the entire system without extra compensations.

E. It is not the intent of this section of the specifications (or the remainder of the contract documents) to make any specific Contractor, other than the Contractor holding the prime contract, responsible to the Owner, Architect and Engineer. All transactions such as submittal of shop drawings, claims for extra costs, requests for equipment or materials substitution, shall be done through the Contractor to the Architect (if applicable), then to the Engineer.

F. This section of the Specifications or the arrangement of the contract documents shall not be construed as an attempt to arbitrarily assign responsibility for work, material, equipment or services to a particular trade Contractor or Sub-Contractor. Unless stated otherwise, the subdivision and assignment of work under the various sections shall be the responsibility of the Contractor holding the prime contract.

G. It is the intent of this Contract to deliver to the Owner a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall

be responsibility of the Contractors involved to remove and/or relocate or re-attach any existing or new systems which interfere with new equipment or materials to be installed by other trades without additional cost to the Owner.

H. The Contractor shall provide interim life safety and fire detection measures as required by the Authority Having Jurisdiction, Division 1 specifications, NFPA, and applicable Codes. This includes temporary relocations of heat/smoke detection, exit signage, and egress lighting in existing buildings as applicable.

I. In general, and to the extent possible, all work shall be accomplished without interruption of the existing facilities' operations. Each Contractor shall advise the Architect, Owner and Engineer (as applicable) in writing at least one week prior to the deliberate interruption of any services. The Owner shall be advised of the exact time that interruption will occur and the length of time the interruption will occur. Failure to comply with this requirement may result in complete work stoppage by the Contractors involved until a complete schedule of interruptions can be developed.

J. Whenever utilities are interrupted, either deliberately or accidentally, the Contractor shall work continuously to restore said service. The Contractor shall provide tools, materials, skilled journeymen of his own and other trades as necessary, premium time as needed and coordination with all applicable utilities, including payment of utility company charges (if any), all without request for extra compensation to the Owner, except where otherwise provided for in the contract document.

K. The Contractor shall be responsible for maintaining existing fire alarm, paging, access control, intrusion detection, CCTV, nurse call systems, etc., in occupied spaces in renovation and addition projects. The Contractor shall be required to disconnect and remove all existing devices in renovated areas (where directed as such) without affecting system operations. All costs associated with said work shall be borne by the Contractor.

L. Definitions:

(1) Prime Contractor - The Contractor who has been engaged by the Owner in a contractual relationship to accomplish the work.

(2) Electrical Contractor - Any Contractor whether bidding or working independently or under the supervision of a General Contractor, that is: the one holding the Prime Contract and who installs any type of Electrical work, such as: power, lighting, television, telecommunications, data, fiber optic, intercom, fire detection and alarm, security, video, underground or overhead electrical, etc.

Note: Any reference within these specifications to a specific entity, i.e., "Electrical Contractor" is not to be construed as an attempt to limit or define the scope of work for that entity or assign work to a specific trade or contracting entity. Such assignments of responsibility are the responsibility of the Contractor or Construction Manager holding the prime contract, unless otherwise provided herein.

(3) Electrical Sub-Contractor - Each or any Contractor contracted to, or employed by, the Electrical Contractor for any work required by the Electrical Contractor.

(4) Engineer - The Consulting Mechanical-Electrical Engineers, either consulting to the Owner, Architect, other Engineers, etc.

(5) Architect - The Architect of Record for the project, if any.

(6) Furnish - Deliver to the site in good condition.

(7) Provide - Furnish and install in complete working order.

(8) Install - Install equipment furnished by others in complete working order.

(9) Contract Documents - All documents pertinent to the quality and quantity of all work to be performed on the project. Includes, but not limited to: Plans, Specifications, Addenda, Instructions to Bidders, (both General and Sub-Contractors), Unit Prices, Shop Drawings, Field Orders, Change Orders, Cost Breakdowns, Construction Manager's Assignments, Architect's Supplemental Instructions, Periodical Payment Requests, etc.

2. INTENT

A. It is the intent of these specifications and all associated drawings that the Contractor provide finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use."

B. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

3. ELECTRICAL DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the systems and are to be followed insofar as possible. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted in writing to the Engineer for review before proceeding with the work. The Contract Drawings are not intended to show every vertical or horizontal offset which may be necessary to complete the systems. Contractors shall, however, anticipate that additional offsets may be required and submit their bid accordingly.

B. The drawings and specifications are intended to supplement each other. No Contractor or supplier shall take advantage of conflict between them, or between parts of either, but should this condition exist, the Contractor or supplier shall request a clarification of the condition at least ten days prior to the submission of bids so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be the

determining factor. In all instances, unless modified in writing and agreed upon by all parties thereto, the Contract to accomplish the work shall be binding on the affected Contractor.

C. The drawings and specifications shall be considered to be cooperative and complimentary and anything appearing in the specifications which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

D. The Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

E. The Engineer shall reserve the right to make minor adjustments in location of conduit, fixtures, outlets, switches, etc., where he considers such adjustments desirable in the interest of concealing work or presenting a better appearance.

F. The Contractor shall evaluate ceiling heights called for on Architectural Plans. Where the location of Electrical equipment may interfere with ceiling heights, the Contractor shall call this to the attention of the Engineer in writing prior to making the installation. Any such changes shall be anticipated and requested sufficiently in advance so as to not cause extra work on the part of the Contractor or unduly delay the work.

G. Special Note: Always check ceiling heights indicated on Drawings and Schedules and ensure that these heights may be maintained after all mechanical and electrical equipment is installed. If a conflict is apparent, notify the Engineer in writing for instructions.

H. Should overlap of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.

I. The drawings are intended to show the approximate location of equipment, materials, etc. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions whether given in figures or scaled shall be verified in the field. In case of conflict between small- and large-scale drawings, the larger scale drawings shall take precedence.

J. The Contractor and his Sub Contractors shall review all drawings in detail as they may relate to his work (structural, architectural, site survey, mechanical, etc.). Review all drawings for general coordination of work, responsibilities, ceiling clearances, wall penetration points, chase access, fixture elevations, etc. Make any pertinent coordination or apparent conflict comments to the Engineers at least ten days prior to bids, for issuance of clarification by written addendum.

K. Where on any of the drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornament or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.

4. EXAMINATION OF SITE AND CONDITIONS

A. The Contractor shall inform himself of all of the conditions under which the work is to be performed, the site of the work, the structure of the ground, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. All Contractors or suppliers shall carefully examine all Drawings and Specifications and contract documents to determine the kind and type of materials to be used throughout the project and which may, in any way, affect the execution of his work.

B. The Contractor shall fully acquaint himself with all existing conditions as to ingress and egress, distance of haul from supply points, routes for transportation of materials, facilities and services, availability of temporary or permanent utilities, etc. The Contractor shall include in his work all expenses or disbursements in connection with such matters and conditions. The Contractor shall verify all work shown on the drawings and conditions at the site, and shall report in writing to the Engineer ten days prior to bid, any apparent omissions or discrepancies in order that clarifications may be issued by written addendum. No allowance is to be made for lack of knowledge concerning such conditions after bids are accepted.

5. EQUIPMENT AND MATERIALS SUBSTITUTIONS OR DEVIATIONS

A. When any Contractor requests review of substitute materials and/or equipment, and when under an approved formal alternate proposal, it shall be understood and agreed that such substitution, if approved, will be made without additional cost regardless of changes in connections, spacing, service, mounting, etc. In all cases where substitutions affect other trades, the Contractor offering such substitutions shall advise all such Contractors of the change and shall reimburse them for all necessary changes in their work. Any drawings, Specifications, Diagrams, etc., required to describe and coordinate such substitutions or deviations shall be professionally prepared at the responsible Contractor's expense. Special Note: Review of Shop Drawings by the Engineer does not absolve the Contractor of this responsibility

B. References in the specifications to any article, device, product, material, fixture, form, or type of construction by name, make, or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Each Contractor, in such cases, may, at his option, use any article, device, product, material, fixture, form, or type of construction which in the judgment of the Engineer is equivalent to that specified, provided the provisions of paragraph (A) immediately

preceding are met. Substitutions shall be submitted to the Engineer a minimum of ten days prior to bid date for approval to bid in written form thru addenda or other method selected by the Engineer. If prevailing laws of cities, towns, states or countries are more stringent than these specifications regarding such substitutions, then those laws shall prevail over these requirements.

C. Wherever any equipment or material is specified exclusively only such items shall be used unless substitution is accepted in writing by the engineers.

D. The Contractor shall furnish along with his proposal a list of specified equipment and materials which he proposes to provide. Where several makes are mentioned in the Specifications and the Contractor fails to state which he proposes to furnish, the Engineer shall have the right to choose any of the makes mentioned without change in price.

E. The Contractor shall review the contract documents and if a material substitution form is required for each proposed substitution, it shall be submitted per requirements.

6. SUPERVISION OF WORK

A. Each Contractor and Sub-Contractors shall personally supervise the work or have a competent superintendent on the project site at all times during progress of the work, with full authority to act for him in matters related to the project.

7. CODES, RULES, PERMITS, FEES, REGULATIONS, ETC.

A. The Contractor shall give all necessary notices, obtain and pay for all permits, government sales taxes, fees, and other costs including utility connections or extensions, in connection with his work. As necessary, he shall file all required plans, utility easement requests and drawings, survey information on line locations, load calculations, etc., prepare all documents and obtain all necessary approvals of all utility and governmental departments having jurisdiction; obtain all required certificates of inspection for his work and deliver same to the Engineer before request for acceptance and final payment for the work.

B. Ignorance of Codes, Rules, regulations, utility company requirements, laws, etc., shall not diminish or absolve Contractor's responsibilities to provide and complete all work in compliance with such.

C. The Contractor shall include in the work, without extra cost, any labor, materials, services, apparatus or drawings required in order to comply with all applicable laws, ordinances rules and regulations, whether or not shown on drawings and/or specified.

D. All materials furnished and all work installed shall comply with the current edition of the National Electrical Codes, National Fire Codes of the National Fire Protection

Association, the requirements of local utility companies, and with the requirements of all governmental agencies or departments having jurisdiction.

E. All material and equipment for the electrical systems shall bear the approval label, or shall be listed by the Underwriters' Laboratories, Incorporated. Listings by other testing agencies may be acceptable with written approval by the Engineer.

F. All electrical work is to be constructed and installed in accordance with plans and specifications which have been approved in their entirety and/or reflect any changes requested by the State Fire Marshal, as applicable or required. Electrical work shall not commence until such plans are in the hands of the Electrical Contractor.

G. The Contractor shall insure that his work is accomplished in accord with OSHA Standards and any other applicable government requirements.

H. Where conflict arises between any code and the plans and/or specifications, the code shall apply except in the instance where the plans and specifications exceed the requirements of the code. Any changes required as a result of these conflicts shall be brought to the attention of the Engineer at least ten working days prior to bid date, otherwise the Contractor shall make the required changes at his own expense. The provisions of the codes constitute minimum standards for wiring methods, materials, equipment and construction and compliance therewith will be required for all electrical work, except where the drawings and specifications require better materials, equipment, and construction than these minimum standards, in which case the drawings and specifications shall be the minimum standards.

8. COST BREAKDOWNS/SCHEDULE OF VALUES

A. Within thirty days after acceptance of the Contract, the Contractor is required to furnish to the Engineer one copy of a detailed cost breakdown on each respective area of work. These cost breakdowns shall be made on forms provided or approved by the Engineer or Architect. Payments will not be made until satisfactory cost breakdowns are submitted. Refer to the end of this section for a sample of expected level and breakout being required.

9. CORRECTION PERIOD

A. All equipment, apparatus, materials, etc., shall be the best of its respective kind. The Contractor shall replace all materials at his own expense, which fail or are deemed defective as described in the General Conditions. The effective date of completion of the work shall be the date each or any portion of the work is accepted by the Architect or Engineer as being substantially complete.

B. Items of equipment which have longer guarantees, as called for in these specifications or as otherwise offered by the manufacturer, such as generators, engines, batteries, transformers, etc., shall have warranties and guarantees completed in order, and shall be in effect at the time of final acceptance of the work

by the Engineer. The Contractor shall present the Engineer with such warranties and guarantees at the time of final acceptance of the work. The Owner reserves the right to use equipment installed by the Contractor prior to date of final acceptance. Such use of equipment shall in no way invalidate the guarantee except that Owner shall be liable for any damage to equipment during this period due to negligence of his operator or other employee.

10. INSPECTION, APPROVALS AND TESTS

A. Before requesting a final review of the installation from the Architect and/or Engineer, the Contractor shall thoroughly inspect his installation to assure that the work is complete in every detail and that all requirements of the Contract Documents have been fulfilled. Failure to accomplish this may result in charges from the Architect and/or Engineers for unnecessary and undue work on their part.

B. The Contractor shall provide as part of this contract electrical inspection by a competent Electrical Inspection Agency (local or state as specific to project), licensed to provide such services in the State where the project is being completed. The name of this agency shall be included in the list of materials of the Form of Proposal by the Contractor. All costs incidental to the provision of electrical inspections shall be borne by the Electrical Contractor.

C. The Contractor shall advise each Inspection Agency in writing (with an information copy of the correspondence to the Architect and/or Engineer) when he anticipates commencing work. Failure of the Inspection Agency to inspect the work in the stage following and submit the related reports may result in the Contractor's having to expose concealed work not so inspected. Such exposure will be at the expense of the responsible Contractor.

D. Inspections shall be scheduled for rough as well as finished work. The rough inspections shall be divided into as many inspections as may be necessary to cover all roughing-in without fail. Report of each such inspection visit shall be submitted to the Architect, Engineer and the Contractor within three days of the inspection.

E. Approval by an Inspector does not relieve the Contractor from the responsibilities of furnishing equipment having a quality of performance equivalent to the requirements set forth in these plans and specifications. All work under this contract is subject to the review of the Architect and/or Engineer, whose decision is binding.

F. Before final acceptance, the Contractor shall furnish three copies of the certificates of final approval by the Electrical Inspector (as well as all other inspection certificates) to the Engineer with one copy of each to the appropriate government agencies, as applicable. Final payment for the work shall be contingent upon completion of this requirement.

G. The Contractor shall test all wiring and connections for cross connects, continuity and grounds before equipment and fixtures are connected, and when indicated or

required, demonstrate by continuity/load/voltage test and Megger Test the installation of any circuit or group of circuits. Where such tests indicate the possibility of faulty insulation, locate the point of such fault, replacing same with new and demonstrate by further test the elimination of such defect. The secondary service entrance conductors from the utility (source) transformer to the main service disconnecting means shall be megger tested. The results of this test shall be turned over to the engineer for review and approval. Any conductor failing the test shall be replaced and any costs associated shall be borne by the contractor.

11. COMPUTER-BASED SYSTEM SOFTWARE

A. For all equipment, controls, hardware, computer-based systems, programmable logic controllers, and other materials provided as a part of the work, software that is installed shall be certified in writing to the Engineer and Owner by the manufacturer and/or writer to be free of programming errors that might affect the functionality of the intended use.

12. CHANGES IN ELECTRICAL WORK

REFER TO GENERAL AND SPECIAL CONDITIONS.

13. CLAIMS FOR EXTRA COST

REFER TO GENERAL AND SPECIAL CONDITIONS.

14. SURVEYS, MEASUREMENTS AND GRADES

A. The Contractor shall lay out his work and be responsible for all necessary lines, levels, elevations and measurements. He must verify the figures shown on the drawings before laying out the work and will be held responsible for any error resulting from his failure to do so.

B. The Contractor shall base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements at site and check the correctness of same as related to the work.

C. Should the Contractor discover any discrepancy between actual measurements and those indicated, which prevents following good practice or the intent of the drawings and specifications, he shall notify the Engineer thru normal channels of job communication and shall not proceed with his work until he has received instructions from the Engineer.

15. TEMPORARY USE OF EQUIPMENT

A. The permanent electrical equipment, when installed, may be used for temporary services, subject to an agreement among the Contractors involved, the Owner, and

with the consent of the Engineer. Should the permanent systems be used for this purpose, each Contractor shall pay for all temporary connections required and any replacements required due to damage without cost, leaving the equipment and installation in "as new" condition. The Contractor may be required to bear utility costs, user fees, etc.

B. Permission to use the permanent equipment does not relieve the Contractors who utilize this equipment from the responsibility for any damages to the building construction and/or equipment which might result because of its use.

16. TEMPORARY SERVICES

A. The Contractor shall arrange for temporary electrical and other services which he may require to accomplish his work. In the absence of other provisions in the contract, the Contractor shall provide for his own temporary services of all types, including the cost of connections, utility company fees, construction, removal, etc., in his bid.

17. RECORD DRAWINGS

A. The Contractor shall insure that any deviations from the design are being recorded daily or as necessary on record drawings being maintained by the Contractor. Dimensions from fixed, visible permanent lines or landmarks shown in vertical and horizontal ways shall be utilized. Compliance shall be a requirement for final payment. Pay particular attention to the location of underfloor or underground exterior in-contract or utility-owned or leased service lines, main switches and other appurtenances important to the maintenance and safety of the Electrical System. Keep information in a set of drawings set aside at the job site especially for this purpose. Deliver these record drawings electronically to the Engineer in AutoCad 2000 format (or more recent version) along with the hand marked field set. Electronic bid drawings will be furnished to the Contractor for his use at the completion of the work.

18. MATERIALS AND WORKMANSHIP

A. All electrical equipment, materials and articles incorporated in the work shall be new and of comparable quality to that specified. All workmanship shall be first-class and shall be performed by electricians skilled and regularly employed in their respective trades. The Contractor shall determine that the equipment he proposes to furnish can be brought into the building(s) and installed within the space available. All equipment shall be installed so that all parts are readily accessible for inspection, maintenance, replacement, etc. Extra compensation will not be allowed for relocation of equipment for accessibility or for dismantling equipment to obtain entrance into the building(s).

B. All conduit and/or conductors shall be concealed in or below walls, floors or above ceilings unless otherwise noted. All fixtures, devices and wiring required shall be installed to make up complete systems as indicated on the drawings and specified herein.

C. All materials, where applicable, shall bear Underwriters' Laboratories label or that of another Engineer-approved testing agency, where such a standard has been established.

D. Each length of conduit, wireway, duct, conductor, cable, fitting, fixture and device used in the electrical systems shall be stamped or indelibly marked with the makers mark or name.

E. All electrical equipment shall bear the manufacturer's name and address and shall indicate its electrical capacity and characteristics.

F. All electrical materials, equipment and appliances shall conform to the latest standards of the National Electric Manufacturers Association (NEMA) and the National Board of Fire Underwriters (NBFU) and shall be approved by the Owner's insuring agency if so required.

19. QUALIFICATIONS OF WORKMEN

A. All electrical work shall be accomplished by qualified workmen competent in the area of work for which they are responsible. Untrained and incompetent workmen as evidenced by their workmanship shall be relieved of their responsibilities in those areas. The Engineer shall reserve the right to determine the quality of workmanship of any workman and unqualified or incompetent workmen shall refrain from work in areas not satisfactory to him. Requests for relief of a workman shall be made through the normal channels of responsibility established by the Architect or the contract document provisions.

B. All electrical work shall be accomplished by Journeymen electricians under the direct supervision of a licensed Electrician. All applicable codes, utility company regulations, laws and permitting authority of the locality shall be fully complied with by the Contractor.

C. Special electrical systems, such as Fire Detection and Alarm Systems, Intercom or Sound Reinforcement Systems, Telecommunications or Data Systems, Lightning Protection Systems, Video Systems, Special Electronic Systems, Control Systems, etc., shall be installed by workmen normally engaged or employed in these respective trades. As an exception to this, where small amounts of such work are required and are, in the opinion of the Engineer, within the competency of workmen directly employed by the Contractor involved, they may be provided by this Contractor.

20. CONDUCT OF WORKMEN

A. The Contractor shall be responsible for the conduct of all workmen under his supervision. Misconduct on the part of any workmen to the extent of creating a safety hazard, or endangering the lives and property of others, shall result in the prompt relief

of that workman. The consumption or influence of alcoholic beverages, narcotics or illegally used controlled substances on the jobsite is strictly forbidden.

21. COOPERATION AND COORDINATION BETWEEN TRADES

A. The Contractor is expressly directed to read the General Conditions and all detailed sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Mechanical, Structural and other pertinent Drawings, to the end that complete coordination between trades will be affected.

B. Refer to Coordination Among Trades, Systems Interfacing and Connection of Equipment Furnished by Others section of these Specifications for further coordination requirements.

22. PROTECTION OF EQUIPMENT

A. The Contractor shall be entirely responsible for all material and equipment furnished by him in connection with his work and special care shall be taken to properly protect all parts thereof from damage during the construction period. Such protection shall be by a means acceptable to the Engineer. All rough-in conduit shall be properly plugged or capped during construction in a manner approved by the Engineer. Equipment damaged while stored on site either before or after installation shall be repaired or replaced (as determined by the Engineer) by the responsible Contractor.

23. CONCRETE WORK

A. The Contractor shall be responsible for the provision of all concrete work required for the installation of any of his systems or equipment. If this work is provided by another trade, it will not relieve the Electrical Contractor of his responsibilities relative to dimensions, quality of workmanship, locations, etc. In the absence of other concrete specifications, all concrete related to Electrical work shall be 3000 PSI minimum compression strength at 28 days curing and shall conform to the standards of the American Concrete Institute Publication ACI-318. Heavy equipment shall not be set on pads for at least seven days after pour.

B. All floor mounted equipment shall have be provided with pads. All concrete pads shall be complete with all pipe sleeves, embeds, anchor bolts, reinforcing steel, concrete, etc., as required. Pads larger than l8" in width shall be reinforced with minimum #4 round bars on 6" centers both ways. All reinforcing steel shall be per ASTM requirements, tied properly, lapped 18 bar diameters and supported appropriately up off form, slab or underlayment. Bars shall be approximately 3" above the bottom of the pad with a minimum 2" cover. All parts of pads and foundations shall be properly rodded or vibrated. If exposed parts of the pads and foundations are rough or show honeycomb after removing forms properly adhered repairs shall be made. If structural integrity is violated, the concrete shall be replaced. All surfaces shall be rubbed to a smooth finish.

Special Note: All pads and concrete lighting standard bases shall be crowned slightly so as to avoid water ponding beneath equipment.

C. In general, concrete pads for small equipment shall extend 6" beyond the equipment's base dimensions. For large equipment with service access panels, extend pads l8" beyond base or overall dimensions to allow walking and servicing space at locations requiring service access.

D. Exterior concrete pads shall be 4" minimum above grade and 4" below grade on a tamped 4" dense grade rock base unless otherwise noted or required by utility company. Surfaces of all foundations and bases shall have a smooth finish with three-quarter inch radius or chamfer on exposed edges, troweled or rubbed smooth. All exterior pads shall be crowned approximately 1/8" per foot, sloping from center for drainage.

24. RESTORATION OF NEW OR EXISTING SHRUBS, PAVING, ETC.

A. The Contractor shall restore to their original condition all paving, curbing surfaces, drainage ditches, structures, fences, shrubs, existing or new building surfaces and appurtenances, and any other items damaged or removed by his operations. Replacement and repairs shall be in accordance with good construction practice and shall match materials employed in the original construction of the item to be replaced. All repairs shall be to the satisfaction of the Engineer, and in accord with the Architect's standards for such work, as applicable.

25. MAINTENANCE OF EXISTING UTILITIES AND LINES

A. The locations of all piping, conduits, cables, utilities and manholes existing, or otherwise, that come within the contract construction site, shall be subject to continuous uninterrupted maintenance with no exception unless the Owner of the utilities grants permission to interrupt same temporarily, if need be. Provide one week's written notice to Engineer, Architect and Owner prior to interrupting any utility service or line. Also see Article 1. - General, this section.

B. Known utilities and lines as available to the Engineer are shown on the drawings. However, it is additionally required that, prior to any excavation being performed, each Contractor ascertain that no utilities or lines, known or unknown, are endangered by the excavation.

C. If the above-mentioned utilities or lines occur in the earth within the construction site, the Contractor shall first probe and make every effort to locate the lines prior to excavating in the respective area. Electromagnetic utility locators and acoustic pipe locators shall be utilized to determine where metallic and non-metallic piping is buried prior to any excavation.

D. Cutting into existing utilities and services shall be done in coordination with and as designated by the Owner of the utility. The Contractor shall work continuously to

restore service(s) upon deliberate or accidental interruption, providing premium time and materials as needed without extra claim to the Owner.

E. The Contractor shall repair to the satisfaction of the Engineer any surface or subsurface improvements damaged during the course of the work, unless such improvement is shown to be abandoned or removed.

F. Machine excavation shall not be permitted within ten feet of existing gas or fuel lines. Hand excavate only in these areas, in accord with utility company, agency or other applicable laws, standards or regulations.

G. Protect all new or existing lines from damage by traffic, etc. during construction.

H. Protect existing trees, indicated to remain with fencing or other approved method. Hold all new subsurface lines outside the drip line of trees, offsetting as necessary to protect root structures. Refer to planting or landscaping plans, or in their absence, consult with the Architect.

26. SMOKE AND FIRE PROOFING

A. The Contractor shall not penetrate rated fire walls, ceilings or floors with conduit, cable, bus duct, wireway or other raceway system unless all penetrations are protected in a code compliant manner which maintains the rating of the assembly. Smoke and fire stop all openings made in walls, chases, ceiling and floors. Patch all openings around conduit, wireway, bus duct, etc., with appropriate type material to smoke stop walls and provide needed fire rating at fire walls, ceilings and floors. Smoke and fire proofing materials and method of application shall be approved by the local authority having jurisdiction.

27. QUIET OPERATION, SUPPORTS, VIBRATION AND OSCILLATION

A. All work shall operate under all conditions of load without any objectionable sound or vibration, the performance of which shall be determined by the Engineer. Noise from moving machinery or vibration noticeable outside of room in which it is installed, or annoyingly noticeable noise or vibration inside such room, will be considered objectionable. Sound or vibration conditions considered objectionable by the Engineer shall be corrected in an approved manner by the Contractor (or Contractors responsible) at his expense.

B. All equipment subject to vibration and/or oscillation shall be mounted on vibration supports suitable for the purpose of minimizing noise and vibration transmission, and shall be isolated from external connections such as piping, ducts, etc., by means of flexible connectors, vibration absorbers or other approved means. Surface mounted equipment such as panels, switches, etc., shall be affixed tightly to their mounting surface.

C. The Contractor shall provide supports for all equipment furnished by him using an approved vibration isolating type as needed. Supports shall be liberally sized and adequate to carry the load of the equipment and the loads of attached equipment, piping, etc. All equipment shall be securely fastened to the structure either directly or indirectly through supporting members by means of bolts or equally effective means. No work shall depend on the supports or work of unrelated trades unless specifically authorized in writing by the Architect or Engineer.

28. FINAL CONNECTIONS TO EQUIPMENT

A. The roughing-in and final connections to all electrically operated equipment furnished under this and all other sections of the contract documents or by others, shall be included in the Contract and shall consist of furnishing all labor and materials for connection. The Contractor shall carefully coordinate with equipment suppliers, manufacturers representatives, the vendor or other trades to provide complete electrical and dimensional interface to all such equipment (kitchen, hoods, mechanical equipment, panels, refrigeration equipment, etc.).

29. WELDING

A. The Contractor shall be responsible for quality of welding done by his organization and shall repair or replace any work not done in accordance with the Architect's or structural Engineer's specifications for such work. If required by the Engineer, the responsible Contractor shall cut at least three welds during the job for X-raying and testing. These welds are to be selected at random and shall be tested as a part of the responsible Contractor's work. Certification of these tests and X-rays shall be submitted, in triplicate, to the Engineer. In case a faulty weld is discovered, the Contractor shall be required to furnish additional tests and corrective measures until satisfactory results are obtained.

30. ACCESSIBILITY

A. The Contractor shall be responsible for the sufficiency of the size of shafts and chases, the adequate clearance in partitions and above suspended ceilings for the proper installation of his work. He shall cooperate with the General Contractor (or Construction Manager) and all other Contractors whose work is in the same space, and shall advise each Contractor of his requirements. Such spaces and clearances shall be kept to the minimum size required to ensure adequate clearance and access.

B. The Contractor shall locate all equipment which must be serviced, operated, or maintained in fully accessible positions. Equipment shall include but not be limited to junction boxes, pull boxes, contactors, panels, disconnects, controllers, switchgear, etc. Minor deviations from drawings may be made to allow for better accessibility, and any change shall be approved where the equipment is concealed.

C. Each Contractor shall provide (or arrange for the provision by other trades) the access panels for each concealed junction box, pull box, fixtures or electrical device requiring

access or service as shown on Engineer's plans or as required. Locations of these panels shall be identified in sufficient time to be installed in the normal course of work. All access panels shall be installed in accord with the Architect's standards for such work.

D. Access Doors; in Ceilings or Walls:

(1) In mechanical, electrical, or service spaces:

14-gauge aluminum brushed satin finish, 1" border.

(2) In finished areas:

14-gauge primed steel with 1" border to accept the architectural finishes specified for the space. Confirm these provisions with the Architect prior to obtaining materials or installing any such work.

(3) In fire or smoke rated partitions, access doors shall be provided that equal or exceed the required rating of the construction they are mounted in.

31. ELECTRICAL CONNECTIONS

A. The Contractor shall furnish and install all power wiring complete from power source to motor or equipment junction box, including power wiring through starters. The Contractor shall install all starters not factory mounted on equipment. Unless otherwise noted, the supplier of equipment shall furnish starters with the equipment. Also refer to Divisions 11, 14, 20, 21, 22, 23 and 25 of the Specifications, shop drawings and equipment schedules for additional information.

B. All control, interlock, sensor, thermocouple and other wiring required for equipment operation shall be provided by the Contractor. All such installations shall be fully compliant with all requirements of Division 26 and 27 regardless of which trade actually installs such wiring. Motors and equipment shall be provided for current and voltage characteristics as indicated or required. All wiring shall be enclosed in raceways unless otherwise noted.

C. Each Contractor or sub-contractor, prior to bidding the work, shall coordinate power, control, sensor, interlock and all other wiring requirements for equipment or motors with all other contractors or sub-contractors, to ensure all needed wiring is provided in the Contract. Failure to make such coordination shall not be justification for claims of extra cost or a time extension to the Contract.

32. MOTORS

A. Each motor shall be provided by the equipment supplier, installer or manufacturer with conduit terminal box and N.E.C. required disconnecting means as indicated or required. Three-phase motors shall be provided with external thermal overload

protection in their starter units. Single-phase motors shall be provided with thermal overload protection, integral to their windings or external, in control unit. All motors shall be installed with NEMA-rated starters as specified and shall be connected per the National Electrical Code.

B. The capacity of each motor shall be sufficient to operate associated driven devices under all conditions of operation and load and without overload, and at least of the horsepower indicated or specified. Each motor shall be selected for quiet operation, maximum efficiency and lowest starting KVA per horsepower as applicable. Motors producing excessive noise or vibration shall be replaced by the responsible contractor. See Division 20, 22 and 23 of the Specifications for further requirements and scheduled sizes.

C. All three-phase motors shall be tested for proper rotation. Correct wiring if needed and retest. Document testing and corrective action in operations and maintenance manual.

33. CUTTING AND PATCHING

A. Unless otherwise indicated or specified, the Contractor shall provide cutting and patching necessary to install the work specified in this Division. Patching shall match adjacent surfaces to the satisfaction of the Engineer and shall be in accord with the Architect's standards for such work, as applicable.

B. No structural members shall be cut without the approval of the Structural Engineer and all such cutting shall be done in a manner directed by him.

C. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore, all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

34. ANCHORS

A. Each Contractor shall provide and locate all inserts required for his work before the floors and walls are built, or shall be responsible for the cost of cutting and patching required where inserts were not installed, or where incorrectly located. Each Contractor shall do all drilling required for the installation of his hangers. Drilling of anchor holes may be prohibited in post-tensioned concrete construction, in which case the Contractor shall request approved methods from the Architect and shall carefully coordinate setting of inserts, etc., with the Structural Engineer and/or Architect.

35. WEATHERPROOFING

A. Where any work pierces waterproofing, including waterproof concrete, the method of installation shall be as approved by the Architect and/or Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

B. Wherever work penetrates roofing, it shall be done in a manner that will not diminish or void the roofing guarantee or warranty in any way. Coordinate all such work with the roofing installer.

36. OPERATING INSTRUCTIONS

A. Upon completion of all work and all tests, each Contractor shall furnish the necessary skilled labor and helpers for operating his systems and equipment for a period of three days of eight hours each, or as otherwise specified. During this period, instruct the Owner or his representative fully in the operations, adjustment, and maintenance of all equipment furnished. Give at least one week's written notice to the Owner, Architect and Engineer in advance of this period. The Engineer may attend any such training sessions or operational demonstrations. The Contractor shall certify in writing to the Engineer that such demonstrations have taken place, noting the date, time and names of the Owner's representative that were present.

B. Each Contractor shall furnish three complete bound sets for approval to the Engineer of typewritten and/or blueprinted instructions for operating and maintaining all systems and equipment included in this contract. All instructions shall be submitted in draft, for approval, prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions.

C. Each Contractor, in the above-mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this contract and a detailed, easy to read parts list and the name and address of the nearest source of supply.

D. Formatting & content shall follow the guidelines outlined in the latest version of ASHRAE Applications Handbook, Guideline 4. As a minimum, the following shall be included:

- The operation and maintenance document directory should provide easy access and be well organized and clearly identified.
- Emergency information should be immediately available during emergencies and should include emergency and staff and/or agency notification procedures.
- The operating manual should contain the following information:

I. General Information
   a. Building function
   b. Building description
   c. Operating standards and logs

II. Technical Information
   a. System description
   b. Operating routines and procedures
   c. Seasonal start-up and shutdown
   d. Special procedures
   e. Basic troubleshooting

- The maintenance manual should contain the following information:
  I. Equipment data sheets
     a. Operating and nameplate data
     b. Warranty

  II. Maintenance program information
     a. Manufacturer's installation, operation, and maintenance instructions
     b. Spare parts information
     c. Preventive maintenance actions
     d. Schedule of actions
     e. Action description
     f. History
- Test reports document observed performance during start-up and commissioning.

37. SCAFFOLDING, RIGGING AND HOISTING

A. The Contractor shall furnish all scaffolding, rigging, hoisting, and services necessary for erection and delivery into the premises of any equipment and apparatus furnished. Remove same from premises when no longer required.

38. CLEANING

A. The Contractor shall, at all times, keep the area of his work presentable to the public and clean of rubbish caused by his operations; and at the completion of the work, shall remove all rubbish, all of his tools, equipment, temporary work and surplus materials, from and about the premises, and shall leave the work clean and ready for use. If the Contractor does not attend to such cleaning immediately upon request, the Engineer may cause cleaning to be done by others and charge the cost of same to the responsible Contractor. Each Contractor shall be responsible for all damage from fire which originates in, or is propagated by, accumulations of his rubbish or debris.

B. After completion of all work and before final acceptance of the work, each Contractor shall thoroughly clean all equipment and materials and shall remove all foreign matter such as grease, dirt, plaster, labels, stickers, etc., from the exterior of materials, equipment and all associated fabrication. Pay particular attention to finished area surfaces such as lighting fixture lenses, lamps, reflectors, panels, etc.

39. PAINTING

A. Each fixture device, panel, junction box, etc., that is located in a finished area shall be provided with finish of color and type as selected or approved by the Architect or Engineer. If custom color is required, it shall be provided at no additional cost to the Owner. All other equipment, fixtures or devices located in finished or unfinished areas, that are not required to have or are provided with finish color or coating shall be provided in a prime painted condition, ready to receive finish paint or coating. All galvanized metal in finished areas shall be properly prepared with special processes to receive finish paint as directed and approved by the Architect.

40. INDEMNIFICATION

A. The Contractor shall hold harmless and indemnify the Engineer, employees, officers, agents and consultants from all claims, loss, damage, actions, causes of actions, expense and/or liability resulting from, brought for, or on account of any personal injury or property damage received or sustained by any person, persons, (including third parties), or any property growing out of, occurring, or attributable to any work performed under or related to this contract, resulting in whole or in part from the negligence of the Contractor, any subcontractor, any employee, agent or representative.

41. HAZARDOUS MATERIALS

A. The Contractor is hereby advised that it is possible that asbestos and/or other hazardous materials are or were present in this building(s). Any worker, occupant, visitor, inspector, etc., who encounters any material of whose content they are not certain shall promptly report the existence and location of that material to the Contractor and/or Owner. The Contractor shall, as a part of his work, ensure that his workers are aware of this potential and what they are to do in the event of suspicion. He shall also keep uninformed persons from the premises during construction. Furthermore, the Contractor shall insure that no one comes near to or in contact with any such material or fumes therefrom until its content can be ascertained to be non-hazardous.

B. CMTA, Inc., Consulting Engineers, have no expertise in the determination of the presence of hazardous materials. Therefore, no attempt has been made by them to identify the existence or location of any such material. Furthermore, CMTA nor any affiliate thereof will neither offer nor make any recommendations relative to the removal, handling or disposal of such material.

C. If the work interfaces, connects or relates in any way with or to existing components which contain or bear any hazardous material, asbestos being one, then, it shall be the Contractor's sole responsibility to contact the Owner and so advise him immediately.

D. The Contractor by execution of the contract for any work and/or by the accomplishment of any work thereby agrees to bring no claim relative to hazardous materials for negligence, breach of contract, indemnity, or any other such item against CMTA, its principals, employees, agents or consultants. Also, the Contractor further

agrees to defend, indemnify and hold CMTA, its principals, employees, agents and consultants, harmless from any such related claims which may be brought by any subcontractors, suppliers or any other third parties.

42. ABOVE-CEILING AND FINAL PUNCH LISTS

A. The Contractor shall review each area and prepare a punch list for each of the subcontractors, as applicable, for at least two stages of the project:

(1) For review of above-ceiling work that will be concealed by tile or other materials well before substantial completion.

(2) For review of all other work as the project nears substantial completion.

B. When all work from the Contractor's punch list is complete at each of these stages and prior to completing ceiling installations (or at the final punch list stage), the Contractor shall request that the Engineer develop a punch list. This request is to be made in writing seven days prior to the proposed date. After all corrections have been made from the Engineer's punch list, the Contractor shall review and initial off on each item. This signed-off punch list shall be submitted to the Engineer. The Engineer shall return to the site once to review each punch list and all work prior to the ceilings being installed and at the final punch list review.

C. If additional visits are required by the Engineer to review work not completed by this review, the Engineer shall be reimbursed directly by the Contractor by check or money order (due net 10 days from date of each additional visit) at a rate of $140.00 per hour for extra trips required to complete either of the above-ceiling or final punch lists.



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The following is CMTA's guide for required electrical information relative to the Schedule of Values. Please utilize all items that pertain to this project and add any specialized system as required. A thorough and detailed schedule of values will allow for fair and equitable Pay Application approval and minimize any discrepancies as to the status of the job.

Electrical

Description of Work	Scheduled Value	Labor	Material
Shop Drawings			
Mobilization/Permits			
Temporary Utilities			
Demolition			
Site Utilities			
Switchgear			
Branch Panels			
Feeder Conduit			
Branch Conduit			
Feeder Wire			
Branch Wiring			
Emergency Generator			
Fire Alarm Conduit & Wiring			
Fire Alarm Devices			
Cabletray & Accessories			
Light Fixture Interior			
Light Fixture Exterior			

Lighting Control System			
Wiring Devices			
Surge Suppression			
Chemical Grounding System			
Intercom/Paging Conduit			
Intercom/Paging Wiring			
Intercom/Paging Devices			
CCTV System Conduit			
CCTV System Wiring			
CCTV System Devices			
Intrusion Detection Conduit			
Intrusion Detection Wiring			
Intrusion Detection Controller & Devices			
Voice/Data System Conduit			
Voice/Data System Wiring			
Voice/Data System Devices & Termination			
Audio/Video System Conduit			
Audio/Video System Wiring			
Audio/Video System Devices & Termination			
Electrical Inspection			
Owner Training			
Record Drawings			
O & M Manuals			
Punch List / Closeout			

END OF SECTION 26 05 01

SECTION 26 05 02 - SCOPE OF THE ELECTRICAL WORK

1. GENERAL

   Each Electrical Contractor's attention is directed to Section 260501 - General Provisions, Electrical, and all other Contract Documents as they apply to his work.

2. SCOPE OF THE ELECTRICAL WORK

   The Electrical work for this project includes all labor, materials, equipment, fixtures, excavation, backfill and related items required to completely install, test, verify place in service and deliver to the Owner complete electrical systems in accordance with the accompanying plans and all provisions of these specifications. This work shall primarily include, but is not limited to the following:

   A. All conduits, conductors, outlet boxes, fittings, etc.

   B. All switchgear, panels, disconnect switches, fuses, transformers, contactors, starters, individual circuit breakers, etc.

   C. Fault Current, Arc Flash and Coordination Studies.

   D. All wiring devices and device plates.

   E. Electrical connection to all electrically operated equipment furnished and/or installed by others, including powered casework, kitchen equipment, etc.

   F. Voice/Data wiring system.

   G. Fire alarm system.

   H. All necessary coordination with electric utility company, telephone company, cable television company, etc. to ensure that work, connections, etc., that they are to provide is accomplished and that service to this facility is delivered complete prior to occupancy.

   I. Paying all necessary fees and cost for permits, inspections, work by utility companies (power, telephone, CATV, etc). The Contractor shall contact the utility companies prior to submitting a bid to determine exactly these charges will be.

   J. Prior to submitting a bid, the Contractor shall contact all serving utility companies to determine exactly what each utility company will provide and exactly what is required of the Contractor and the Contractor shall include all such requirements in his base bid.

   K. Obtaining, coordinating and paying all necessary fees and costs for permits and inspections required by local, state and federal law. The Contractor shall contact the appropriate agencies prior to submitting a bid to determine exactly these charges will be.

END OF SECTION 26 05 02

SECTION 26 05 03 - SHOP DRAWINGS, LITERATURE, MANUALS, PARTS LISTS, AND SPECIAL TOOLS

1. SHOP DRAWINGS

A. Each Contractor shall submit to the Architect and/or Engineer, within thirty days after the date of the Contract, seven sets of shop drawings and/or manufacturer's descriptive literature on all equipment required for the fulfillment of his contract. Each shop drawing and/or manufacturer's descriptive literature shall have proper notation indicated on it and shall be clearly referenced so the specifications, schedules, light fixture numbers, panel names and numbers, etc., so that the Architect and/or Engineer may readily determine the particular item the Contractor proposes to furnish. All data and information scheduled, noted or specified by hand shall be noted in color red on the submittals. The Contractor shall make any corrections or changes required and shall resubmit for final review as requested. Review of such drawings, descriptive literature and/or schedules shall not relieve the Contractor from responsibility for deviation from drawings or specifications unless they have, in writing, directed the reviewer's attention to such deviations at the time of submission of drawings, literature and manuals; nor shall it relieve them from responsibility for errors or omissions of any nature in shop drawings, literature and manuals. The term "as specified" will not be accepted.

B. If the Contractor fails to comply with the requirements set forth above, the Architect and/or Engineer shall have the option of selecting any or all items listed in the specifications or on the drawings, and the Contractor will be required to provide all materials in accordance with this list.

C. Review of shop drawings by the Engineer applies only to conformance with the design concept of the project and general compliance with the information given in the contract documents. In all cases, the installing Contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, for seeing that all equipment fits the available space in a satisfactory manner and that piping, electrical and all other connections are suitably located.

D. The Engineer's review of shop drawings, schedules or other required submittal data shall not relieve the Contractor from responsibility for the adaptability of the equipment or materials to the project, compliance with applicable codes, rules, regulations, information that pertains to fabrication and installation, dimensions and quantities, electrical characteristics, and coordination of the work with all other trades involved in this project.

E. No cutting, fitting, rough-in, connections, etc., shall be accomplished until reviewed equipment shop drawings are in the hands of the Contractors concerned. It shall be each Contractor's responsibility to obtain reviewed shop drawings and to make all connections, etc. in the neatest and most workmanlike manner possible. Each Contractor shall coordinate with all the other Contractors having any connections, roughing-in, etc., to the equipment, to make certain proper fit, space coordination, voltage and phase relationships are accomplished.

F. In accord with the provisions specified hereinbefore, shop drawings, descriptive literature and schedules shall be submitted on each of the following indicated items as well as any equipment or systems deemed necessary by the Engineer:

Power Equipment

- Fault current coordination study (submit along with switchgear & panelboards).
- Switchgear and panelboards.
- Circuit breakers or fusible switches, per each type.
- Dry-type transformers.
- Disconnect switches.
- Fuses, per each type required.
- Magnetic starters, if not submitted with unit equipment by supplier.
- Control components (relays, timers, selector switches, pilots, etc.)
- Building service grounding electrode components.
- Metering devices.
- Transient voltage surge suppression system.
- Grounding system.

Raceways

- Cable tray and each type of cable tray fitting.
- Wireways and each type of wireway fitting.
- Surface-mounted metal or plastic raceways, with each type of fitting.
- J-hook or Bridle ring assemblies.

Devices

- Each type of wiring device and their coverplates.
- Floor boxes, each by type, with required accessories.
- Data/voice/video wallplates, each by type.
- Any special items not listed above.

Systems

Note: Each system submittal is to be complete with legible cutsheets for all devices, equipment, special wiring, etc. Include system specific wiring schematics showing each device and its specific interconnect/wiring requirements. For rack mounted equipment, provide a scalable elevation drawing with proposed component locations & specific interconnect wiring requirements for each component/panel. Also provide scale building specific layout drawings that indicate device placement, wiring, etc. Refer to the specific system's specification for additional submittal requirements where required.

- Fire alarm system.
- Data network.

Miscellaneous

- Control panel assemblies.
- Non-standard junction/pullboxes.
- Manholes, hand holes, and all outdoor electrical equipment and fittings.

2. SPECIAL WRENCHES, TOOLS AND KEYS

A. Each Contractor shall provide, along with the equipment provided, any special wrenches or tools necessary to dismantle or service equipment or appliances installed by him. Wrenches shall include necessary keys, handles and operators for valves, switches, breakers, etc. and keys to electrical panels, emergency generators, alarm pull boxes and panels, etc. At least two of any such special wrench, keys, etc. shall be turned over to the Architect prior to completion of the project. Obtain a receipt that this has been accomplished and forward a copy to the Engineer.

3. FIRE ALARM SHOP DRAWINGS

A. The Contractor and equipment supplier shall submit to the Architect and/or Engineer, fire alarm system shop drawings complete with catalog cuts, descriptive literature and complete system wiring diagrams for their review prior to the Contractor's submittal to the Commonwealth's Department of Housing, Buildings and Construction or other governing authority for their review. No work shall be done until drawings are approved by the Kentucky Department of Housing, Buildings and Construction.

4. MAINTENANCE AND OPERATION MANUALS

A. Prior to substantial completion of the project, the Contractor shall deliver to the Engineers (in addition to the required Shop Drawings) three complete copies of operation and maintenance instructions and parts lists for all equipment provided. Formatting and content shall follow the guidelines outlined in the latest version of ASHRAE Application Handbook, Guideline 4. As a minimum, the following shall be included:

- The **operation and maintenance document directory** should provide easy access and be well organized and clearly identified.
- **Emergency information** should be immediately available during emergencies and should include emergency and staff and/or agency notification procedures.
- **The operating manual** should contain the following information:
  I. General Information
     a. Building function
     b. Building description
     c. Operating standards and logs

  II. Technical Information
     a. System description
     b. Operating routines and procedures

c. Seasonal start-up and shutdown
d. Special procedures
e. Basic troubleshooting

- **The maintenance manual** should contain the following information:
  I. Equipment data sheets
     a. Operating and nameplate data
     b. Warranty

  II. Maintenance program information
     a. Manufacturer's installation, operation, and maintenance instructions
     b. Spare parts information
     c. Preventive maintenance actions
     d. Schedule of actions
     e. Action description
     f. History

- **Test reports** document observed performance during start-up and commissioning.

END OF SECTION 26 05 03

SECTION 26 05 04 - SLEEVING, CUTTING, PATCHING AND REPAIRING

1. GENERAL

A. The Contractor shall be responsible for all openings, sleeves, trenches, etc. that he may require in floors, roofs, ceilings, walls, etc. and shall coordinate all such work with the General Contractor and all other trades. He shall determine and coordinate any openings which he is to provide before submitting a bid proposal in order to avoid conflict and disagreement during construction. Improperly located openings shall be reworked at the expense of the responsible Contractor.

B. The Contractor shall plan his work ahead and shall place sleeves, frames or forms through all walls, floors and ceilings during the initial construction, where it is necessary for conduit, buss duct, conductors, wireways, etc. to go through; however, when this is not done, this Contractor shall do all cutting and patching required for the installation of his work, or he shall pay other trades for doing this work when so directed by the Architect. Any damage caused to the building by the workmen of the responsible Contractor must be corrected or rectified by him at his own expense.

C. The Contractor shall cut holes in casework, equipment panels, etc. (if any), as required to pass pipes in and out.

D. The Contractor shall notify other trades in due time where he will require openings of chases in new concrete or masonry. He shall set all concrete inserts and sleeves for his work. Failing to do this, he shall cut openings for his work and patch same as required at his own expense.

E. Openings in slabs and walls shall be cut with core drill. Hammer devices will not be permitted. Edges of trenches and large openings shall be scribe cut with a masonry saw.

F. Cast iron sleeves shall be installed through all walls where pipe enters the building below grade. Sleeves shall be flush with each face of the wall and shall be sufficiently larger than the entering pipe to permit thorough caulking with lead and oakum between pipe and sleeve for waterproofing.

G. In all cases, sleeves shall be at least two inches larger than nominal pipe diameter.

H. Sleeves passing through roof or exterior wall or where there is a possibility of water leakage and damage shall be caulked water tight for horizontal sleeves and flashed and counter-flashed with lead (4 lb.) or copper and soldered to the piping, lapped over sleeve and properly weather sealed. Any roof penetration shall not void or lessen the warranty in any way.

I. All rectangular or special shaped openings in plaster, stucco or similar materials including gypsum board shall be framed by means of plaster frames, casing beads, wood or metal angle members as required. The intent of this requirements is to provide smooth even

termination of wall, floor and ceiling finishes as well as to provide a fastening means for lighting fixtures, panels, etc. Lintels shall be provided where indicated over all openings in bearing walls, etc.

J. No cutting is to be done at points or in a manner that will weaken the structure and unnecessary cutting must be avoided. If in doubt, contact the Architect.

K. The Contractor shall be responsible for properly shoring, bracing, supporting, etc. any existing and/or new construction to guard against cracking, settling, collapsing, displacing or weakening while openings are being made. Any damage occurring to the existing and/or new structures, due to failure to exercise proper precautions or due to action of the elements, shall be promptly and properly made good to the satisfaction of the Architect.

L. All work improperly done or not done at all as required by the Contractor will be performed by others. The cost of this work shall be paid for by the Contractor who is in non-compliance with the Contract.

2. SLEEVES, PLATES AND ESCUTCHEONS

A. The Contractor shall provide and locate all sleeves required for his work before the floors and surface being penetrated are built, otherwise the Contractor shall core drill for conduits where sleeves were not installed, or where incorrectly located. Core drilling is the only acceptable alternative to sleeves. Do not chisel openings. Where sleeves are placed in exterior walls or in slabs on grade, the space between the conduit and the sleeves shall be made completely and permanently water tight.

B. Conduits that penetrates fire and/or smoke rated assemblies shall have sleeves installed as required by the manufacturer of the rating seal used.

C. At all other locations either pipe sleeves or core drilled openings are acceptable.

D. Where thermal expansion does not occur, the wall may be sealed tight to the conduit.

E. Sleeves shall be constructed of rigid steel conduit. Sleeves in floors shall extend 6" above finished floor level.

F. Fasten sleeves securely in floors, walls, so that they will not become displaced when concrete is poured or when other construction is built around them. Take precautions to prevent concrete, plaster or other materials being forced into the space between pipe and sleeve during construction.

G. In all areas where ducts are exposed and ducts pass thru floors, the opening shall be surrounded by a 4 inch high by 3 inch wide concrete curb.

H. Escutcheon plates shall be provided for all conduit passing thru walls, floors and ceilings. Plates shall be nickel plated, of the split ring type, of size to match the pipe or conduit.

Where plates are provided for pipes passing thru sleeves which extend above the floor surface, provide deep recessed plates to conceal the sleeves.

I. When installing conduit, pipe, or any other work in insulated concrete form (ICF) walls, the responsible subcontractor for the work shall provide spray foam insulation to patch the rigid insulation to maintain full integrity of the insulating value of the wall after the mechanical and electrical work is complete. Furthermore all new work shall NOT be installed in concrete center of wall. All mechanical and electrical installations shall be on the interior side of the concrete.

END OF SECTION 26 05 04

SECTION 26 05 05 - DEMOLITION, RESTORATION AND SALVAGE

1. GENERAL

   A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and all other divisions of these specifications apply to work specified in this section.

   B. Carefully review the general demolition notes listed on the contract documents for full scope of demolition work as it relates to this project. This includes, but is not limited to, the full demolition scope for all equipment replacement, and the removal of abandoned conductors per NEC requirements. Notify the engineer with any questions prior to removal of equipment, devices or cabling.

2. DESCRIPTION OF WORK

   A. This section covers all demolition, restoration and salvage required to perform the electrical work indicated on the drawings, specified and/or as required to complete the project. It is the intent of this section of work to remove all existing electrical equipment, materials, etc. which are not required for the completed building and to restore any and all finished surfaces to their original type and conditions. To accomplish these requirements, the Contractor(s) shall, at his own expense, engage the services of others already performing finish work on this project. All work shall be completed to the satisfaction of the Architect/Engineers whose decisions shall be final. This requirement shall apply to all restoration work whether indicated or specified.

   B. The Contractor shall lawfully dispose of any removed P.C.B.-bearing ballasts (containing polychlorinated biphenyl), and all mercury-vapor bearing lamps, in accordance with all state, local, federal and other applicable laws and regulations.

3. ELECTRICAL

   A. Where electrical fixtures, equipment or other materials are removed and/or relocated, all abandoned conduit and conductors shall be removed in exposed areas. In concealed areas, materials shall be abandoned in place or removed as indicated and patch all openings.

   B. The Contractor shall be responsible for the removal and/or relocation of any electrical equipment, fixtures, devices, appurtenances, etc., which may, in the course of construction, interfere with the installation of any new and/or relocated Architectural, Mechanical, Electrical, Structural or Fire Protection Systems whether indicated or not.

4. REPAIR

A. Unless otherwise indicated, the Contractor shall be responsible for the patching and repairing of all holes, etc. in the ceiling, wall and floors where electrical equipment is removed.

5. SALVAGE

A. It is the intent of this section to deliver to the Owner all components of any electrical system which may be economically reused by him. The Contractor shall make every effort to remove reusable components without damage and deliver them to a location designated by the Owner.

END OF SECTION 26 05 05

SECTION 26 05 08 - COORDINATION AMONG TRADES, SYSTEMS INTERFACING AND CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

1. COORDINATION

A. The Contractor is expressly directed to read the General Conditions and all sections of these specifications for all other trades and to study all drawings applicable to his work, including Architectural, Plumbing, Fire Protection, Mechanical and Structural drawings, to the end that complete coordination between trades will be affected. Each Contractor shall make known to all other contractors the intended positioning of materials, raceways, supports, equipment and the intended order of his work. Coordinate all work with other trades and proceed with the installation in a manner that will not create delays for other trades or affect the Owner's operations.

B. Special attention to coordination shall be given to points where raceways, fixtures, etc., must cross other ducts or conduit, where lighting fixtures must be recessed in ceilings, and where fixtures, conduit and devices must recess into walls, soffits, columns, etc. It shall be the responsibility of each Contractor to leave the necessary room for other trades. No extra compensation or time will be allowed to cover the cost of removing fixtures, devices, conduit, ducts, etc. or equipment found encroaching on space required by others.

C. The Contractor shall be responsible for coordination with all trades to insure that they have made provision for connections, operational switches, disconnect switches, fused disconnects, etc., for electrically operated equipment provided under this or any other division of the specifications, or as called for on the drawings. Any connection, circuiting, disconnects, fuses, etc., that are required for equipment operation shall be provided as a part of this contract.

D. If any discrepancies occur between accompanying drawings and these specifications and drawings and specifications covering other trade's work, each trade shall report such discrepancies to the Architect far enough in advance so that a workable solution can be presented. No extra payment will be allowed for relocation of fixtures, devices, conduit, and equipment not installed or connected in accordance with the above instructions.

E. In all areas where air diffusers, devices, lighting fixtures and other ceiling-mounted devices are to be installed, the Mechanical Trade(s) and the Electrical Trade and the General Trades shall coordinate their respective construction and installations so as to provide a combined symmetrical arrangement that is acceptable to the Architect and Engineer. Where applicable, refer to reflected ceiling plans. Request layouts from the Architect or Engineer where in doubt about the potential acceptability of an installation.

2. INTERFACING

Each Electrical Trade, Specialty Controls Trade, Mechanical Trade and the General Trades, etc., shall insure that coordination is effected relative to interfacing of all systems. Some typical interface points are (but not necessarily all):

A. Connection of Telecommunications (voice, video, data) lines to Owner's existing or new services.

B. Connection of Power lines to Owner's existing or new services.

C. Connection of fuel oil and exhaust piping to emergency generator and furnishing of fuel for testing unit. Provide a full tank at final acceptance.

D. Connection of all controls to equipment.

E. Electrical power connections to electrically operated (or controlled) equipment.

F. Electrical provisions for all equipment provided by other trades or suppliers within this contract.

3. CONNECTION OF EQUIPMENT FURNISHED BY OTHERS

A. Each Contractor shall make all connections to equipment furnished by others, whenever such equipment is shown on any part of the drawings or mentioned in any part of the Specifications, unless otherwise specifically specified hereinafter.

B. All drawings are complementary, one trade of the other. It is the Contractor's responsibility to examine all drawings and specifications to determine the full scope of his work. The project Engineers have arranged the specifications and drawings in their given order solely as a convenience in organizing the project, and in no way shall they imply the assignment of work to specific trades, contractors, subcontractors or suppliers.

C. Supervision to assure proper installation, functioning and operation shall be provided by the Contractor furnishing the equipment or apparatus to be connected.

D. Items indicated on the drawings as rough-in only (RIO) will be connected by the equipment supplier or Owner, as indicated. The Contractor shall be responsible for rough-in provisions only as indicated. These rough-ins shall be in accord with the manufacturer's or supplier's requirements.

E. For items furnished by others, relocated, or RIO, the Contractor shall obtain from the supplier or shall field determine as appropriate, the exact rough-in locations and connection sizes for the referenced equipment.

F. The Contractor shall be responsible for coordinating with the General and all other trades, as necessary, to determine any and all final connections that he is to make to equipment furnished by others.

END OF SECTION 26 05 08

SECTION 26 05 19 - CONDUCTORS, IDENTIFICATIONS, SPLICING DEVICES AND CONNECTORS

1. GENERAL

   A. This section of the Specifications covers all of the electrical power, lighting, and control power (line voltage) conductors, but does not include communications, data or signal system conductors, which are specified separately in these specifications.

   B. All conduits installed without conductors shall have a 200 lb. test nylon string installed for future use, tied off securely at each end.

   C. **No more than 40% conduit fill is permitted for <u>any</u> conduit system, including video, intercom, data, power or other signal circuits unless specifically indicated otherwise on the plans.**

   D. Lighting circuits: No more than five conductors shall be installed in conduit except for switch legs and travelers in multi-point switching arrangements.

   E. Receptacle circuits: If multiple circuits are pulled in a single homerun, a dedicated neutral shall be provided for each phase conductor. In these cases, a maximum of seven conductors are permitted in a single conduit. Conductors shall be derated per N.E.C.

   F. Intentional or unintentional painting of exposed low voltage or line voltage cabling is prohibited. The contractor shall ensure that exposed cabling is adequately protected from direct painting or overspray whether painting is required within the electrical specifications or required by other disciplines/trades. The contractor shall review the painting requirements for all disciplines and shall provide cabling protection as required.
   Where exposed cabling is being installed in exposed ceiling or wall spaces that are required to be painted, the contractor shall provide alternate options for cable colors and shall provide submittals for such cabling to engineer for approval.

2. MATERIALS

   A. CONDUCTORS

      (1) All conductors shall be 98% conductive annealed copper unless otherwise noted, UL listed and labeled.

      (2) Lighting and receptacle branch circuits shall be not less than No. 12 copper wire or of the sizes shown on the drawings with Type THW, THHN or THWN insulation. All feeder circuits shall be Type THW or THWN of the size as shown on the Contract Drawings. THHN wiring shall only be installed in overhead, dry or damp locations.

THWN or THW wiring shall be used for all circuits pulled in underground or other wet locations.

(3) Conductors No. 10 and smaller sizes of wire shall be solid. Conductors No. 8 and larger sizes shall be stranded.

(4) Conductors for fire alarm wiring shall be stranded and in full compliance with N.E.C. 760. All fire alarm conductors shall be installed within conduit and enclosed junction boxes.

(5) All wire on the project shall be new, in good condition, and shall be delivered in standard coils or reels.

(6) The color of the wire shall be selected to conform with Section 210-5 of the latest edition of the National Electrical Code. Refer also to 260519-4, Color Coding.

(7) All equipment grounding conductors shall have green color insulation or if larger than #8, shall be taped for two inches, green color at every termination and pullbox access point.

(8) Conductors used for motor connections and connections to vibrating or oscillating equipment shall be extra flexible.

(9) Conductors for main ground from neutral bus, equipment grounding bus, building steel, grounding grid and main cold water pipe connection shall be bare copper.

(10) All conductors shall be identified by color code and by means of labels placed on conductors in all junction boxes and at each terminal point with Brady, Ideal, T & B or approved equivalent labels indicating source, circuit No. or terminal No.

(11) Branch wiring and feeder conductors that are greater than 100' in length shall be increased at least one size to compensate for voltage drop. All circuits shall be installed and sized for a maximum 2% voltage drop. As calculated using 80% of the supply breaker rating as the load. Adjust conductors and conduit size accordingly for actual field installed conditions.

(12) No aluminum conductors shall be used.

A. SPLICING DEVICES & CONNECTORS

(1) Splicing devices for use on No. 14 to No. 10 AWG conductors shall be pressure type such as T & B "STA-KON", Burndy, Reliable or approved equivalent.

(2) Wire nuts shall be spring pressure type, insulation 600V, 105°C insulation, up to #8 size. Greater than #6 Cu shall be a compression type connection, 600V insulation, cold shrink tubing, taped to restore full insulation value of the wire being spliced.

(3) Pressure crimp-applied ring type (or fork with upturned ends) terminations shall be employed on motor and equipment terminals where such terminals are provided on motor and equipment leads or on all stranded wire terminations using No. 10 AWG or smaller conductors.

(4) Splices, where necessary, shall be made with hydraulically-set "Hy-press" or equivalent crimped connectors. All splices shall be insulated to the full value of the wiring insulation using a cold-shrink kit or the equivalent in built-up materials.

(5) Large connectors (lugs) at terminals shall be mechanical type, hex-head socket or crimp-on style, installed per the manufacturer's recommendations.

(6) Exterior underground connections made between bare ground wires or to ground rods shall be exothermically welded, "Cadweld" or equivalent.

(7) The use of split-bolt clamps will be permitted in wireways at service entrance only. Torque to 55 foot-pounds or as recommended by manufacturer.

2. INSTALLATION

A. The pulling of all wires and cable on this project shall be performed in strict compliance with applicable sections of the National Electrical Code. No conductor entering or leaving a cabinet or box shall be deflected in such a manner as to cause excess pressure on the conductor insulation. Conductors shall only be installed after insulating bushings are in place.

B. The radius of bending of conductors shall be not less than eighteen times the outside diameter of the conductor insulation or more, if recommended by the manufacturer.

C. Conductors installed within environmental air plenums shall be per N.E.C. Article 800 and other applicable codes, with FEP-type insulation or an approved equivalent. Also provide plenum-rated tie-wraps where plastic straps or other supports, etc., are installed in plenum areas.

D. Where indicated, communications conductors that are installed exposed shall not be routed across ceilings or ductwork. They shall be held up against building structure or against permanent support members. They shall be installed in such a manner that they do not interfere with the access to or operation of equipment or removal of ceiling tiles. Tie-wraps shall be installed in such a manner so as to bundle conductors neatly, allowing runouts of single conductors or groups to drop down to equipment served. Install grommeting where dropping out of trays or into panels or service columns. Install sleeves with bushings where penetrating partitions. Firestop sleeves with approved material. Do not penetrate firewalls if so indicated on plans. Refer to the drawings for support requirements and details on routing exposed communications conductors.

E. Conductors for isolated power systems shall be installed in as short a run of conduit as practicable. No pulling soap shall be used on conductors in isolated power systems.

F. Where conductors are installed in industrial facilities, they shall be per J.I.C. standards.

G. Maximum permissible pulling tensions, as recommended by the manufacturer for any given type of cable or wire installed shall not be exceeded. Utilize special remote readout equipment as required to ensure compliance. Use particular caution when installing twisted pair data cable or fiber optic cables -- forces permitted for pulling in are typically very low for these cable types.

H. All cables and wiring, regardless of voltage, installed in manholes or cable vaults shall be routed in such a manner to provide a minimum of 6 feet of slack cable for future splicing. Install cables along walls by utilizing the longer route from entry to exit. If both routes are symmetrical, provide a loop of cable secured to wall. All cables shall be tied to insulated cable supports on wall-mounted racks, spaced a maximum of three feet apart.

I. Where multiwire branch circuits are allowed, the phases and neutral shall be wire-tied together in the panelboard and in all pull boxes.

3. COLOR CODING DISTRIBUTION VOLTAGE CONDUCTORS, 600 VOLT OR LESS

A. Conductors to be color coded as follows:

(1) 120/208 Volt Conductors
Phase A - Black
Phase B - Red
Phase C - Blue
Neutral - Solid White or White with tracer stripe to match phase conductor

(2) 277/480 Volt Conductors
Phase A - Brown
Phase B - Orange
Phase C - Yellow
Neutral – Solid Gray or White with tracer stripe to match phase conductor

(3) Isolated Power Conductors (Type XLP or XHHN)
Phase A – Brown with colored stripe other than white, green or grey
Phase B Device or Neutral- Orange with colored stripe other than white, green or grey
Phase C - Yellow with colored stripe other than white, green or grey
Neutral on Three-Phase Systems- Solid White or White with tracer stripe to match phase conductor

Note: Further identify isolated power conductors with 2" wide purple tape at all terminations and junctions.

(1) Control Wiring - Red, or as indicated.

(2) Conductors within enclosures that may be energized when enclosure disconnect is off - yellow, or taped with 1/2" yellow tape every 6" of length, inside enclosure. Provide lamacoid plate warning sign on front of enclosure where this condition occurs.

(3) D.C. Wiring - Positive - Light Blue
Negative - Dark Blue

4. COMMUNICATIONS CONDUCTORS

A. Communications conductors shall be of type suitable for the service, installed in accordance with the manufacturer's recommendations for pulling tensions, support, terminations, proximity to high power fields, etc. Types not indicated on this schedule but indicated on plans shall be as noted or required for the service. If in doubt, contact the Engineer for clarification.

B. Plenum-rated conductors (per N.E.C.) shall be installed where required by codes. If installation is thru an approved raceway system that excludes the wiring from the plenum, non-plenum type may be used.

C. All communications cables shall be furnished and installed in compliance with U.L. 444, U.L. 13, N.E.C. 800, 725, 760 and all applicable codes and standards, for premises or riser installations.

D. Riser cables shall be provided in accord with current edition of the N.E. Code.

E. Schedule of Wiring Types - Plenum-Rated

Data Circuits	24 AWG, 4 Pair Certified Category Six augmented U.T.P. Plenum-Rated	Anixter #CMP-00424 FAS-5B Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
Voice Circuits	24 AWG, 4 Pair Certified Category Six augmented U.T.P. Plenum-Rated	Anixter #CMP-00424 FAS-5B Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
Voice Circuits	24 AWG, 4 Pair Category Five U.T.P. Plenum-Rated	Anixter #CMP-00422 HAH-3 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent

Video Drops	RG-6/U Coaxial, 18 AWG Solid Conductor, Plenum-Rated	Belden #89120 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
Video Trunks	RG-11/U Coaxial, 14 AWG Solid Conductor, Plenum-Rated	Belden #89292 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
T-1 Premises Extension Cable	T-1, 4 Pair 22 AWG, Plenum-Rated Pairs Individually Shielded	Anixter #CMP-00422T1-3 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
6-Strand Fiber (or # of Strands as Noted)	Multimode 50/125 Micron, Plenum-Rated	Anixter #370-COROM2-TBD-06 Superior Essex TE Connectivity Siecor Equivalent Berk-Tek Equivalent
Speaker Cable	22 AWG. 1 Pair Shielded	Belden #88761 Superior Essex TE Connectivity W.P.W. Equivalent Anixter Equivalent
Speaker Cable, with Call-In Unshielded Pair	22 AWG. 1 Pair Shielded, 1 Pair 22 AWG. Unshielded	Belden #88723 Superior Essex TE Connectivity W.P.W. Equivalent Anixter Equivalent
100 Pair Telephone Cable	24 AWG. 100 Pairs, Non-Plenum Exchange Cable, Wet Location Rated, Gel-Filled Certified Category Three	Anixter #E-010024DFC Superior Essex TE Connectivity Belden Equivalent A.T.&T. Equivalent

- OR -

F. Schedule of Wiring Types - Non-Plenum Rated

Data Circuits	24 AWG, 4 Pair Certified Category Six augmented U.T.P.	Anixter #CM-00423PND-6A-06 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
Voice Circuits	24 AWG, 4 Pair Certified Category Six augmented U.T.P.	Anixter #CM-00423PND-6A-06 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
Voice Circuits	24 AWG, 4 Pair Category Three U.T.P.	Anixter #CM-00422 BAG-3 Superior Essex Belden Equivalent W.P.W. Equivalent
Video Drops	RG-6/U Coaxial 18 AWG Solid Conductor	Belden #9060 Superior Essex Anixter Equivalent W.P.W. Equivalent
Video Trunks	RG-11/U Coaxial, 14 AWG Solid Conductor	Belden #1523A Superior Essex E Connectivity Anixter Equivalent W.P.W. Equivalent
T-1 Premises Extension Cable	T-1, 4 Pair 22 AWG, Pairs Individually Shielded	Anixter #CM-00422 MIGT-3 Superior Essex TE Connectivity Belden Equivalent Berk-Tek Equivalent
6-Strand Fiber (or # of Strands as Noted)	Multimode 50/125 Micron	Anixter #370-947-SMODE-12 Superior Essex TE Connectivity

		Siecor Equivalent Berk-Tek Equivalent
12-Strand Fiber (or # of Strands as Noted)	Singlemode 8.3/125 Micron	Superior Essex TE Connectivity Siecor Equivalent Berk-Tek Equivalent
Speaker Cable	22 AWG. 1 Pair Shielded, Plenum-Rated, Stranded	Belden #9414 Superior Essex TE Connectivity Equivalent W.P.W. or Anixter
Speaker Cable with Call-In Pair	22 AWG. 1 Pair Shielded, 1 Pair 22 AWG. Unshielded for Call-In, Plenum-Rated	Belden #8730 Superior Essex TE Connectivity W.P.W. Equivalent Anixter Equivalent
100 Pair Telephone Cable	24 AWG. 100 Pairs, Non-Plenum Exchange Cable, Wet Location Rated, Gel-Filled, Certified Category Three, Installed in Metal Conduit	Anixter #E-010024DFC Superior Essex TE Connectivity Belden Equivalent A.T.&T. Equivalent

5. HIGH VOLTAGE PRIMARY CABLE

A. High voltage primary cable shall be rated for aerial, direct burial, open tray, wet location and submersible underground service. Cable shall be I.P.C.E.A. - listed and UL listed for the use indicated.

B. Cable shall be rated 15 K.V., nominal. Insulation shall be XLP, XLPE or approved equivalent with a nominal 133% value.

C. Cable shall be shielded, grounded, with extruded 8 mil. semiconducting layer bonded to the insulation. Provide with copper drain wires served over semiconducting layer.

D. Cable shall be installed in accordance with manufacturer's recommendations, with particular attention to termination, handling, bending radii and pull tension recommendations.

E. The conductor shall be copper with Class "B" stranding per ASTM B-8.

F. Cable shall be as manufactured by G.E., Anaconda, Phelps-Dodge, Okonite, or approved equivalent.

G. Cable shall be manufactured per the following standards: UL 1072 and ICEA for medium voltage cable.

H. (1) Cable shall be terminated at pad-mount transformer or as indicated with pre-manufactured load-break, dead-front elbows and fittings compatible with cable and rated for the purpose. Pre-manufactured elbows and other types of fittings indicated shall be as manufactured by Elastimold Co., Blackburn-ITT, R.T.E. Corporation, S & C Company or other approved equivalent.

(2) Cable terminators for 15 K.V., 200 ampere connection shall be ANSI Standard 386-1877 200 amp hot-stick operable load break elbow with voltage test point. The elbow shall be furnished with the necessary cable adapter for terminating the copper cable used.

(3) Electrical ratings shall be as follows:

Voltage ..... 15 KV class
Continuous and Load Break Current ..... 200 amps, rms
BIL .....95 KV
Withstand Voltage (AC) ..... 34 KV, 60 HZ, 1 minute
Short-Time Current .....10,000 amps, rms, sym., 17 seconds.

(4) Cable terminators for 15 K.V., 600 ampere connection shall be ANSI Standard 368-1977 premolded dead break unit for terminating 15 KV shielded cable. The connector shall be fully shielded, of dead front operation and shall be fully submersible. The connector shall be furnished with proper adapters for terminating the copper cable used.

(5) The connectors shall have the following ratings:

Voltage ..... 15 KV Class
Continuous Current..... 600 amps, rms
BIL .....95 KV
8 Hour Overload..... 900 amps, rms
Withstand Voltage (AC) .....35 KV, 60 Hz, 1 minute
Momentary .....25,000 amps, rms, sym, .17 seconds

I. Cable shall be color coded at all terminations and junctions as follows:

Phase A - Black
Phase B - Red
Phase C - Blue

Follow the above color coding unless otherwise indicated or required by system user.

J. Cable grounding at all terminations shall be in accord with the manufacturer's recommendations and applicable codes.

K. A full size (matching phase conductors) copper 600 volt insulated ground is to be provided with each primary circuit.

L. Installation, termination and testing of primary power cables shall be accomplished by Journeymen Electricians with at least three years experience with such work.

M. In lieu of using pre-manufactured elbows and other fittings, installer may substitute field-build and taped stress cones or other type of termination, subject to written prior approval of the engineer. In requesting such approval, submit complete data on materials proposed to be used and tools to be used in cutting and stripping cable.

N. All new primary cable shall be high-potential tested in accord with criteria outlined herein. Where taps, splices or terminations to existing primary cables are indicated on the plans, the Engineer reserves the right to request high-potential testing of the existing cable or systems to determine their suitability and safety, if not so indicated on the plans.

O. Always field verify exact primary power voltage potentials with the supplying utility and report any discrepancy from that indicated on the plans to the Engineer prior to placing any primary cable in service.

6. TESTING OF PRIMARY CABLE

A. All new primary cable shall be tested prior to energization in accord with the following criteria, or other approved method.

(1) Use equipment made by one of the following (or approved equivalent) and abide by their operation rules for their respective equipment:

a. Associated Research, Inc.
b. J.G. Biddle Company
c. Hipotronics, Inc.
d. Von Corporation

(2) Clear cable of all equipment, switchgear, etc. for elbows, install insulation plugs. On cable end, insulate by high voltage taping, insulating jar or plastic. All terminations and splices shall be completely and properly grounded. All adjacent equipment shall be grounded, where danger of flashover exists.

(3) A sphere gap in parallel with the 100,000 volt D.C. "Hipot" tester shall be calibrated for sparkover at 70 KV D.C.

(4) The direct current test voltage shall be applied in increments of 5 KV and shall be left at the step for 1 minute. Saturate cable for 15 minutes at test voltage as in (5) below.

(5) Test: (as appropriate)

a. 15 KV cables with open terminations at 55 KV D.C.
b. 15 KV cables with elbow termination at 45 KV D.C., or to the limit of the elbow or splice. Verify with manufacturer.

SPECIAL NOTE: It is suggested that tests be performed when relative humidity is 50 to 60% or less in clear, dry weather for greater safety.

(6) Record the leakage current at each step and at end of saturation time.

(7) Acceptance: The above procedure with less than 100 microamperes of current registered.

(8) Proof test on existing cable at 35 KV for 5a and 35 KV for 5b above.

(9) After test (in order listed):

a. Turn tester power off.
b. Discharge tester and cable thru a resistive discharge device (8 MEGOHM discharge stick).
c. Ground cable thru a grounding means (#12 AWG THW wire to ground).
d. Disconnect tester.

(10) For Safety:

a. Wear high voltage gloves at all times.
b. Treat cable and tester as high voltage at all times.
c. Remember, D.C. static charges can be very harmful.

(11) All tests must be made in the presence of the Engineer and shall be recorded on a form sheet signed by the person performing the test and dated. Three (3) copies shall be submitted to the Engineer. Provide 48 hour advance written notice to Engineer.

END OF SECTION 26 05 19

SECTION 26 05 26 – GROUNDING AND BONDING

1. GENERAL

   A. All metallic conduit, raceways, cable trays, wireways, supports, cabinets and equipment shall be grounded in accordance with the latest issue of the National Electrical Code, as shown on the Contract Drawings and in accord with the requirements of the local authority having jurisdiction, as applicable.

   B. The size of the equipment grounding conductors, grounding electrode conductors and service grounding conductors shall be not less than that given in Article No. 250 of the National Electrical Code, and/or as shown on the Contract Drawings. Where ungrounded conductor sizes are increased to minimize voltage drop, grounded conductor sizes shall be increased in the proper proportion.

   C. Grounding bus and non-current carrying metallic parts of all equipment and raceway systems shall be securely grounded by connection to common ground.

   D. The service entrance main ground bus shall also be connected to the main cold metallic water pipe within three feet of where it enters the building, on both the house and street sides of the main shut-off valve with a properly sized bonding jumper. A properly sized bonding jumper shall also be provided to the frame of any steel structure utilized in the construction. The steel frame of the building (if any) shall be made electrically continuous.

2. MATERIALS

   A. Ground wires and cables shall be of the AWG sizes shown on the Contract Drawings or shall be sized in accord with the prevailing codes. All ground wires and cables shall be copper.

   B. All grounding fittings shall be heavy cast bronze or copper of the mechanical type except for underground installations or interconnection of grounding grid to cable, columns and ground electrodes, which shall be thermically welded type as manufactured by Cadweld, Burndy Co., Therm-O-Weld, or approved equivalent. Other bonding clamps or fittings in above ground locations shall be as manufactured by O.A. Co., T & B, Burndy, or approved equivalent.

   C. Ground electrode pipe systems shall be solid copper construction. Ground rods shall be 5/8" minimum diameter, eight feet long, copper weld steel. All ground electrode systems shall be installed in accord with manufacturer's recommendations, U.L. listings, National Electrical and National Electrical Safety Codes.

3. INSTALLATION

   A. All grounding conductors shall be protected from mechanical injury and shall be rigidly supported. Where ground conductors are run through flexible conduit and through

panelboard switchboards or motor control center feeders, they shall be securely bonded to such conduit thru the use of grounding bushings at the entrance and exit. All connection of equipment shall be made with an approved type of solderless connection and same shall be bolted or clamped to equipment or conduit.

B. All equipment grounding conductors to lighting fixtures, devices, receptacles, electric heaters, furnace and other equipment not exceeding No. 8 AWG in size shall be green colored Type "THWN".

C. Equipment ground connections to GFI circuit breakers shall be carried and bonded to each outlet on the circuit. Provide a separate equipment grounding conductor with green color insulation.

D. Resistance to the grounding at the service entrance equipment shall be in accordance with the N.E.C. for style of construction and shall not exceed ten ohms as measured by the described testing method.

E. All circuits shall have a separate grounding conductor, except as otherwise noted.

F. When grounding systems are completely installed and all grading in the area of the service grounding electrode has been completed up to finish elevations, perform a fall-of potential or other approved test to determine actual system resistance to earth. Report results to the Engineer in writing. Refer to testing provisions in this section of specifications.

G. Where separately-derived systems are utilized as part of the power distribution network, the neutral leg of the secondary side of generators, transformers, etc., shall be connected to a grounding electrode in accordance with the manufacturer's recommendations.

H. The Contractor shall ensure that the ground return path thru building structural steel or other means is electrically continuous back to the service grounding electrode and is of adequate capacity and impedance to carry the maximum expected fault or other current. Where no electrically continuous steel building frame is available, the Contractor shall provide a properly sized ground bar and ground conductor routed back to the main facility ground bus.

I. Where a building's steel frame is made electrically discontinuous by masonry breaks (as at firewalls, etc.), the Contractor shall provide an accessible thermically welded bonding jumper of #500MCM copper to bond the building steel frame sections together, making the entire steel frame electrically continuous. The installation of these bonding jumpers shall be reviewed by the Engineer prior to their being covered by construction.

J. Where lightning protection systems are utilized on the work, their electrodes and conductors shall be electrically segregated from the building service ground, except where connections to structural elements are required for the proper installation of these systems. Lightning protection grounds shall only be utilized for lightning grounding applications, in accord with U.L. and manufacturer's recommendations.

K. Grounding connections shall **never** be made to fire protection, natural gas, flammable gas or liquid fuel piping, except where specifically indicated on the plans.

L. Where dielectric fittings are utilized in piping systems, the piping system shall **not** be utilized as a ground path. Bonding jumpers shall not be utilized to bridge over such fittings. Piping systems shall not be utilized as ground paths except where specifically required by codes in the case of water piping.

4. GROUNDING ELECTRODE SYSTEM

A. The ground electrode system shall be as specified herein. The system shall not require maintenance throughout the expected life span of the materials.

B. Ground system shall be an electrolytic rod type, as manufactured by Lyncole XIT Grounding, Superior Grounding Systems, L.E.C., Inc. (Chem-Rod), or approved equivalent. Electrode(s) shall be placed as shown on the plans, installed exactly per manufacturer's recommendations. Electrodes shall be installed vertically, 12 feet of overall length (or length as indicated), set in a drilled hole and backfilled per manufacturer's instructions with a special clay slurry surrounding the rod. Provide a concrete protection box with cast iron grate for the top of the rod termination. Ground system shall be per the following:

(1) Manufacturer: Lyncole XIT Grounding (or approved equivalent).
(2) Source: Lyncole XIT Grounding, 22412 S. Normandie Ave., Torrance, CA 90502 1-800-962-2610
(3) Shaft Configuration: Straight.
(4) Shaft Length: 12 feet (or as otherwise indicated).
(5) Listings: U.L.-467J, ANSI 633.8.
(6) Material: Type K Copper.
(7) Construction: Hollow tube, 2.125" O.D., chemical filled with non-hazardous metallic salts.
(8) Weight 3.5 lbs. per foot of length, nominal.
(9) Ground Wire Termination: Exothermic ("Cadweld" by Contractor) connection to 4/0 conductor, with U-bolt with pressure plate provided as test point.
(10) Average Life Expectancy: 25 Years.
(11) Model Number: K2-(length)CS.
(12) Provide grounding system with the following components: protective box, backfill material. Box to be concrete with cast iron, tamper-resistant lid, backfill to be "Bentonite" clay.

C. Installation of Pipe Ground System

(1) **Pipe ground systems shall be installed exactly as required by the system manufacturer. The Contractor shall be diligent to observe the excavation, sealing tape removal, slurry backfill and all other critical requirements.**

(2) **Note: NEVER USE SAND OR ORDINARY EARTH AS A BACKFILL MATERIAL**

D. Pipe grounding system shall be warranted unconditionally by the Contractor for a period of one year from the date of substantial completion.

5. GROUND TESTING PROCEDURE

A. The actual resistance to earth of the service grounding electrode shall be measured by the Contractor via the fall-of-potential method. This testing shall be accomplished after the grounding electrode has been completely installed and the finished grade is achieved.

B. The results of the testing shall be summarized in a written report by the Contractor, which shall be forwarded to the Engineer for review. The report shall also be included with the operation and maintenance manuals for the Owner's information and future reference. This report is to also contain a detailed description and illustrations of the testing procedure, along with the name and model number of the testing instrument(s).

C. For the actual testing, the Contractor shall follow the procedures outlined below. A self-contained instrument such as a "Megger" or "Ground OHMMETER" shall be used that is designed to eliminate the influence of stray current effects on the accuracy of the measurements.

(1) Connect one side of the instrument to the grounding electrode conductor where it connects to the facility main ground bus (point C1). Disconnect and isolate the grounding electrode conductor for the test.

(2) Drive a copperweld reference electrode probe (point C2) into earth between 300 and 500 feet away from C1 and connect to measurement instrument.

(3) Drive the movable grounding probe (C3) into earth at ten equally spaced intervals, in a straight line between C1 and C2 points and note the E/I=R resistance readings on a graph at each point.

(4) The resistance measurements in OHMS taken from the flat part of the curve shall be averaged to determine the true grounding electrode resistance to earth.

(5) At completion of testing, remove reference electrode C2 and all temporary wiring and connections.

(6) If actual measurements of grounding electrode indicate a resistance greater than five OHMS, contact the Engineer for instructions. If deemed necessary by the Engineer, additional electrodes shall be placed and the measurement process repeated until the desired ground potential achieved.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

B. Related Sections include the following:

1. Division 26 Section "Vibration and Seismic Controls for Electrical Systems" for products and installation requirements necessary for compliance with seismic criteria.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of [**five**] <**Insert number**> times the applied force.

1.5 ACTION SUBMITTALS

A. Product Data: For the following:

1. Steel slotted support systems.
2. Nonmetallic slotted support systems.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following:

1. Trapeze hangers. Include Product Data for components.
2. Steel slotted channel systems. Include Product Data for components.
3. Nonmetallic slotted channel systems. Include Product Data for components.
4. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.8 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories."

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. ERICO International Corporation.
    d. GS Metals Corp.
    e. Thomas & Betts Corporation.
    f. Unistrut; Tyco International, Ltd.
    g. Wesanco, Inc.

3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
4. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
5. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
6. Channel Dimensions: Selected for applicable load criteria.

B. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- (14-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c., in at least 1 surface.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Allied Tube & Conduit.
    b. Cooper B-Line, Inc.; a division of Cooper Industries.
    c. Fabco Plastics Wholesale Limited.
    d. Seasafe, Inc.

3. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
4. Fitting and Accessory Materials: Same as channels and angles.
5. Rated Strength: Selected to suit applicable load criteria.

C. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

D. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of

conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

F. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

G. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Hilti Inc.
        2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
        3) MKT Fastening, LLC.
        4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

    a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Cooper B-Line, Inc.; a division of Cooper Industries.
        2) Empire Tool and Manufacturing Co., Inc.
        3) Hilti Inc.
        4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
        5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other approved support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts or beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use **3000-psi (20.7-MPa),** 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section Miscellaneous Cast-in-Place Concrete, or as shown on the contract documents."

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.

3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. Touchup: Comply with requirements in Division 09 painting Sections, or as otherwise specified on the contract documents for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 31 - CABINETS, OUTLET BOXES AND PULL BOXES

1. GENERAL

   A. This section of the specifications covers all electrical cabinets, outlet boxes and pull boxes.

   B. Continuous runs of conduit shall have properly sized pull boxes at least each eighty-five feet of run, or as near as possible to that limit.

2. MATERIALS & INSTALLATION

   A. Cabinets for lighting and power, telephone, pull boxes, outlet boxes, or any other purposes specified or shown on the Contract Drawings, shall be constructed of code gauge, galvanized steel with sides formed and corner seams riveted or welded before galvanizing. Boxes assembled with sheet metal screws will not be accepted. Pull boxes shall include all boxes used to reduce the run of conduit to the required number of feet or bends, supports, taps, troughs, and similar applications and shall also be constructed as specified above.

   B. All cabinets and boxes for NEMA 1 and 1A application shall be provided with knockouts, as necessary, or shall be cut in the field by approved cutting tools which will provide a clean, symmetrically cut opening. All boxes, except panelboards, shall be provided with code gauge fronts with hex head or pan head screw fasteners. Outdoor cabinets shall be hinged cover with pad locking provisions. Fronts for panelboards shall be as specified for panelboards.

   C. Ceiling outlet boxes shall be galvanized steel, 4" octagonal, not less than 2 1/8" deep, with lugs or ears to secure covers. Those for use with ceiling lighting fixtures shall be fitted with 3/8" fixture studs fastened to the back of the boxes, where applicable. Provide adequate support with at least a 2 x safety factor for the anticipated fixture weight.

   D. Special size concealed outlet boxes for clocks, speakers, alarms, panels, etc., shall be provided by the manufacturer of the equipment.

   E. Floor outlet boxes shall be as specified in Section 262726, fully adjustable unless noted or specified otherwise.

   F. The location of outlets, as shown on the drawings, shall be considered as approximate only. It shall be incumbent upon this Contractor to study the general building drawings, with relation to spaces surrounding each outlet, in order to make his work fit the work of others and in order that when the devices or fixtures are installed, they will be symmetrically located and will not interfere with any other work or equipment. Any change in fixture or layout shall be coordinated with and approved by the Engineer before this change is made. Regardless of the orientation shown on the drawings, all devices shall be easily accessible when installed.

G. Boxes installed in fire rated assemblies shall not compromise the rating of the assembly. The Contractor is responsible for identifying assembly ratings and construction requirements prior to rough-in.

   a. Listed single and double gang metallic outlet and switch boxes with metallic or nonmetallic cover plates may be used in bearing and nonbearing wood stud and steel stud walls with rating not exceeding 2 h. The boxes shall be fastened to the studs with the openings in the wallboard facing cut so that the clearance between the boxes and the wallboard do not exceed 1/8 in. The boxes shall be installed so that the surface area of individual boxes do not exceed 16 sq in, and the aggregate surface area of the boxes do not exceed 100 sq in per 100 sq ft of wall surface unless approved alternate protection materials are used.

   b. Boxes located on opposite sides of walls or partitions shall be separated by a minimum horizontal distance of 24 in. This minimum separation distance between the boxes may be reduced when listed Wall Opening Protective Materials are installed according to the requirements of their Classification.

   c. Boxes installed on opposite sides of walls or partitions of staggered stud construction shall have listed Wall Opening Protective Materials installed with the boxes in accordance with Classification requirements for the protective materials.

   d. All installation shall be done in accordance with AHJ requirements.

H. All outlets, pull boxes, junction boxes, cabinets, etc., shall be sized per the current edition of the National Electrical Code.

I. Cabinets, outlet boxes and junction or pull boxes shall be threaded for rigid-threaded conduit, dust-tight, vapor-tight or weatherproof as required for areas other than for NEMA 1 or 1A application. These shall be as manufactured by Crouse-Hinds, Appleton, Killark, or approved equivalent.

J. NEMA 1 or 1A cabinets, outlet boxes or pull or junction boxes shall be as manufactured by Appleton, Steel City, T & B, or approved equivalent.

K. Outlet boxes for switches, receptacles, telephone, etc., concealed in walls shall be galvanized steel, 2" X 4" X 2" with plaster cover for the number of devices as required. Where outlet boxes are installed in walls of glazed tile, brick, concrete block, or other masonry which will not be covered with plaster or in walls covered by wood wainscot or paneling, deep sectional masonry boxes shall be used and they shall be completely covered with the plates or lighting fixtures. This Contractor shall cooperate with the brick layers, block layers and carpenters to ensure that the outlet boxes are installed straight and snugly in the walls. Receptacles shall be set vertically in walls, unless noted otherwise.

L. Outlet boxes mounted in glazed tile, brick, concrete block or other types of masonry walls shall be mounted above or below the mortar joint. Do Not Split the Mortar Joint.

M. Boxes for more than two devices shall be for the number of devices required and shall be one piece. No ganging of single switch boxes will be allowed.

N. Outlets provided shall have only the holes necessary to accommodate the conduit at the point of installation and shall be rigidly secure in position. Boxes with knockouts removed and openings not used shall be replaced or be provided with a listed knockout closure.

O. Openings for conduit entrance in cabinets and boxes shall be prefabricated, punched, drilled and/or reamed. The use of a cutting torch for this purpose is prohibited.

P. Junction boxes, troughs, pull boxes or similar shall contain no more than three circuits. If boxes containing more circuits are deemed necessary for special circumstances such as fit or coordination, the Contractor shall contact the Engineer for written direction.

Q. Provide a completely separate raceway system, including junction boxes and pull-boxes, for each essential power system, including life safety, critical, equipment, and normal power system for complete separation in accordance with NEC.

R. Identify all junction, outlet and pull boxes in data/mechanical/electrical rooms and above ceilings with panel and circuit designation on outside of covers. Identify all exposed junction, outlet and pull boxes in finished areas with panel and circuit designation on inside of covers. Refer to section 260553 – Identification for additional information.

END OF SECTION 26 05 31

SECTION 26 05 33 - RACEWAYS AND FITTINGS

1. GENERAL

A. This section is intended to specify the raceways, conduit, conduit fittings, hangers, junction boxes, splice boxes, specialties and related items necessary to complete the work as shown on the drawings and specified herein.

B. This section specifies basic materials and methods and is a part of each Division 26, 27 and 28 that implies or refers to electrical raceways specified therein.

C. The types of raceways specified in this section include the following:

(1) Steel electrical metallic tubing. (E.M.T.)
(2) Rigid galvanized steel conduit. (G.R.S.)
(3) Intermediate metal conduit (I.M.C.).
(4) Rigid aluminum conduit.
(5) Flexible metal conduit (aluminum or steel)
(6) Liquid - tight flexible metal conduit.
(7) Rigid nonmetallic conduit.
(8) Surface metal raceways.
(9) Wireways, wall ducts and trench ducts.
(10) Cable tray or cable trough.
(11) Duct banks, and their construction.

D. All raceways, as listed in 1C. above and otherwise specified herein shall be provided in compliance with latest editions of all applicable U.L., NEMA, N.E.C. and A.N.S.I. standards. All conduit, raceways and fittings shall be Underwriters Laboratories listed and labeled, or bear the listing of an agency acceptable to the local authority having jurisdiction.

E. Conduit and raceways, as well as supporting inserts in contact with or enclosed in concrete shall comply with the latest edition of all A.C.I. standards and the equipment manufacturer's recommendations for such work.

F. P.V.C. or other non-metallic conduit shall be rated for the maximum operating temperature that could be developed by the conductors it encloses, while in normal operation.

G. The decision of the Engineer shall be final and binding in any case where a question or inquiry arises regarding the suitability of a particular installation or application of raceways, supports or materials, if other than outlined herein.

H. Minimum size of conduit shall be 3/4" trade size. All conduit and raceways shall be sized for the number of conductors contained, in accord with the latest edition of the National Electrical Code or any other applicable standards.

I. The installer of raceway systems shall avoid the use of dissimilar metals within raceway installations that would result in galvanic-action corrosion.

2. MATERIALS

A. STEEL ELECTRICAL METALLIC TUBING

(1) Electrical metallic tubing, (E.M.T.) of corrosion-resistant steel construction shall be permitted for concealed installation in dry interior locations. Electrical metallic tubing shall not be installed in concrete slabs or where exposed to physical damage. Electrical metallic tubing shall be permitted for exposed work in mechanical and electrical rooms and other exposed structure areas where not subjected to physical damage, as determined by the Engineer.

B. RIGID GALVANIZED STEEL CONDUIT

(1) Rigid galvanized steel conduit shall be used where subject to physical damage for exposed work in mechanical spaces, within factory or other industrial work areas, for exposed fit-up work on machinery, for exposed exterior damp or wet location work, in hazardous atmospheres, in exterior underground locations where installed beneath roadways, where ells occur in underground P.V.C. conduits, or where turning out of concrete encased duct banks, and at other locations as specifically called out on the drawings.

(2) Rigid galvanized steel conduit shall be used for all building interior power wiring or cables of over 600 Volts.

C. INTERMEDIATE METAL CONDUIT

(1) Unless otherwise indicated on the drawings, intermediate metal conduit (I.M.C.) may be used in any location in place of rigid galvanized steel conduit, as permitted by codes, and as approved by the Engineer.

D. RIGID ALUMINUM CONDUIT

(1) Rigid aluminum conduit, shall be permitted for installation indoors in dry locations only. Under no conditions shall it be cast into concrete slabs or pass thru construction where prolonged contact will degrade the aluminum. All ells used in rigid aluminum conduit systems shall be rigid galvanized steel. Rigid aluminum conduit shall always be used for power wiring greater than 5 KVA and higher than 60 Hz frequency.

E. FLEXIBLE METAL CONDUIT

(1) Unless specifically noted otherwise, flexible conduit shall be permitted for final connections to fixtures or equipment only. Flexible conduit may be constructed of aluminum or steel and shall be installed with connectors designed for the purpose. All flexible metal conduit shall be installed as a single piece. No joints shall be permitted.

Flexible conduit shall not be used in wet or dusty locations or where exposed to oil, water or other damaging environments. An equipment grounding conductor or bonding jumper shall be used at all flexible conduit installations. Maximum permitted length of flexible metal conduit shall be 72” unless approved in writing by the Engineer. Flexible metal conduit shall meet the minimum trade sizes listed for general conduits except that 3/8” trade size may be utilized where necessary for fit in walls that are furred out with hat channel of less than 1”.

F. LIQUIDTIGHT FLEXIBLE METAL CONDUIT

(1) Unless specifically noted otherwise, liquidtight flexible conduit shall be permitted for final connections to furniture, fixtures or equipment only. Weatherproof flexible metal conduit shall be wound from a single strip of steel, neoprene covered, equivalent to "Liquatite" or "Sealtite" Type "UA". It shall be installed in such a manner that it will not tend to pull away from the connectors. Provide strain relief fittings equivalent to "Kellems" as required where subject to vibration. Flexible connections to motors in dusty areas shall be dust-tight. Connections in areas exposed to the weather shall be weatherproof. Liquidtight flexible non-metallic conduit is not allowed unless approved by the Engineer.

G. RIGID NON-METALLIC CONDUIT

(1) Rigid non metallic conduit shall be constructed of P.V.C, nominally schedule 40 weight, except where encased in concrete, where it may be "EB" type. If installation will enclose utility company provided conductors, verify exact type required and install in accord with their standards, if more stringent than this specification.

(2) Rigid non-metallic conduit may be used in exterior wet or damp locations where installed underslab or underground. It shall not be run in interior locations, except with special permission from the Engineer for use in corrosive environments, and then only if protected from physical damage. No rigid nonmetallic conduit may be installed in environmental air plenums or cast into above-grade concrete slabs. No rigid nonmetallic conduit may be installed in locations where the ambient temperature might exceed the rating of the raceway.

(3) Where rigid non metallic conduit is placed underground, as for feeder circuits, secondaries or branch circuit runs and where ell is made upward thru a slab on grade, transition the turning ell and the riser to rigid steel conduit to a height of 6" above the concrete slab. Transition may then be made to E.M.T or other approved conduit for remainder of run.

(4) Flexible nonmetallic conduit shall not be used, except by special permission, obtained in writing from the Engineer.

(5) Provide equipment grounding conductors of copper, sized as required by codes, in all circuits installed in rigid nonmetallic raceways.

H. SURFACE METAL RACEWAYS

(1) Surface metal raceways shall be constructed of code gauge corrosion-resistant galvanized steel or aluminum extrusions, and finished in an ivory, buff or grey color as selected by the Architect. Finishes shall be suitable for field painting, prepared by the installing contractor as necessary.

(2) Surface metal raceways, where used as raceways only, shall be sized for the conductors indicated. Nominal minimum size of such raceways shall be equivalent to Wiremold Co. Series #700, or equivalent by Isotrol or other approved manufacturer.

(3) Surface metal raceways to be furnished with integral receptacles shall have Simplex Nema 5-20R outlets spaced on centers as indicated on plans. These shall be Wiremold Co. #2200 Series or equivalent Isotrol or other approved manufacturer.

(4) Surface metal raceways and all components and fittings shall be furnished by a single manufacturer, wherever practical. All trim and cover fittings, flush feed boxes, splices, outlet fittings, etc, necessary for a complete installation shall be provided by the installing contractor. These raceways shall be rigidly mounted with approved fasteners on not to exceed 24" centers in a run, or 6" from ends and on either side of a corner. Refer to plans for notations on exact types of these raceways and outlet configurations.

I. WIREWAYS, WALL DUCT, FLUSH FLOOR TRENCH DUCT

(1) WIREWAYS

a. Wireways of painted steel construction shall be corrosion-resistant, moisture and oil resistant where indicated or necessary. Wireways shall be furnished in nominal sizes of 2 1/2" X 2 1/2", 4" X 4", 6"" X 6", 8" X 8" or 12" X 12", as indicated on plans. Furnish with hinged covers on all runs and removable covers on all fittings, to allow a continuous unobstructed path for conductor installation. Provide knockouts on all runs, unless otherwise indicated or prohibited by codes.

b. Provide wireways with hangers of same manufacturer, installed so as to allow unobstructed access to wireway interior. Install at not to exceed 8'-0" centers, closer as needed at fittings and turns. Use 1/4" rod hangers minimum for up to 4"X4", 3/8" rod minimum up to 8"X8", 1/2" rod minimum for 12" X 12".

c. Wireways shall be equivalent to Square "D" Co. "LD" series, as a minimum standard of construction and quality.

(2) WALL DUCTS

a. Where wall duct type raceways are indicated to be installed flush, they shall be a minimum 3 1/2" deep by 10" wide (or 18" width, as indicated), furnished with screw covers to overlap flange 1" on each side. Covers shall be furnished in nominal 3'-0" lengths. Provide fully grommeted openings or bushed nipples as needed in coverplates to pass cables thru. Where indicated or required, provide transition

fittings between horizontal runs of wireway and wall ducts to properly interface each raceway system.

b. Where wall ducts are installed flush either vertically or horizontally as a collector duct, provide proper blocking and support in stud walls, adding a layer of studs as needed to prevent undercutting major structural elements of walls. Trim flange shall be set tight to wall surface with 1/16" tolerance each way.

c. Wall ducts, if indicated to be surface mounted, shall be furnished with flangeless coverplates.

d. All completed systems shall be provided with a factory prime painted finish, suitable for field finish painting.

e. Wall ducts shall be equivalent to Square D Company "RWT" Series, as a standard of construction and quality.

(3) TRENCH DUCTS

a. Trench duct is to be installed flush with finished concrete floor slab with a vertical tolerance to adjacent surfaces of 1/16" plus or minus. Nominal depth of trench duct shall be adjustable from 2 3/8" to 3 1/2", minimum 12" width unless otherwise noted on plans.

b. Trench duct shall be constructed of code-gauge steel, 14 gauge minimum, with corrosion resistant finish. Surfaces of duct or fittings in contact with concrete shall be painted with two coats of "Asphaltum" or receive equivalent coating or taping prior to placement of concrete.

c. Furnish trench duct with flat turns, riser transition fittings to wall duct or panelboard as shown, concrete tight couplings, internal barriers as required to separate services, reducers, end closers, tees and all other fittings as indicated or required.

d. Furnish coverplates of aluminum, 1/4" thickness minimum, with flush fasteners in nominal 24" lengths. Furnish grommeted openings or nipples with insulated bushings as required. Coverplates shall not deflect more than .085" with application of a 200 pound concentrated load. Any compartment over 16" in width shall have additional coverplate support, to meet the deflection criteria above.

e. Provide (as standard) an aluminum tile trim flange (verify and coordinate with floor finishes). Refer to architectural drawings, where applicable.

f. Trench duct and coverplates shall be equivalent to Square "D" Company RSV/RCP-AL series, as a standard of quality and construction.

J. CABLE TRAY OR CABLE TROUGH

(1) Cable tray shall be furnished in all-aluminum construction or galvanized steel construction, as noted and sized on the drawings.

(2) Galvanized finishes on tray shall be hot-dipped after fabrication for all trays in exterior locations. Mill finished galvanizing may be used where tray is installed indoors in dry locations.

(3) The installing contractor shall carefully follow the manufacturer's recommendations for hanger sizing and hanger support spacing. The weight per linear foot of tray, fully loaded with a 200% safety factor shall be accounted for in sizing hangers. Refer to manufacturer's instructions and/or the drawings, as applicable for hangers and supports. In no case shall supports be spaced further than 8'-0" apart.

(4) Cable tray shall be of the ladder type with rungs spaced 12" apart. Side rails shall be of I-Beam or C-Channel construction with welded rungs, depth and width as indicated on the drawings.

(5) Cable trough shall be similar to cable tray, except bottom shall be a ribbed solid piece, depth and width as indicated on the drawings.

(6) Cable tray or trough shall be provided with all required fittings for a complete installation. Fittings shall include, but not be limited to: Horizontal and vertical elbows and tees, smooth dropout fittings, end closure plates, fixed (or adjustable) splices as needed for field offsets, reducers, barriers or box connector flanges.

(7) Cable tray and trough shall be equivalent to Square "D" Company Series CLA/CLG (ladder tray) or CTA/CTG (trough) as a standard of quality and construction.

K. OPEN WIRE MESH CABLETRAY

(1) Section includes continuous, rigid, welded steel wire mesh cable management system.

(2) References

a. ASTM A 123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

b. ASTM A 510 - General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.

c. ASTM B 633 - Electrodeposited Coatings of Zinc on Iron and Steel.

(3) Design Requirements

a. Maximum Deflection Between Supports: L/240.

(4) Submittals

a. Product Data: Submit manufacturer's product data, including UL classification.

b. Shop Drawings: Submit shop drawings indicating materials, finish, dimensions, and accessories. Show layout, support, and installation details.

c. Manufacturer Qualifications: Submit manufacturer's certification indicating ISO 9002 quality certified.

(5) Delivery, Storage and Handling

a. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

b. Storage: Store materials in a dry area indoors, protected from damage, and in accordance with manufacturer's instructions.

c. Handling: Protect materials and finishes during handling and installation to prevent damage.

(6) Manufacturer

a. Cablofil, Inc., 8319 State Route 4, Mascoutah, IL, 62258. Phone (618) 566-3230. Toll Free (800) 658-4641. Fax (618) 566-3250. www.cablofil.com, or approved equivalent. Part numbers included in this section are not meant to restrict truly equivalent manufacturers.

(7) Open Wire Mesh Cabletray System

a. Description: Continuous, rigid, welded steel wire mesh cable management system.

1) Mesh System: Permitting continuous ventilation of cables and maximum dissipation of heat.

2) Safety Edge: Continuous safety edge T-welded wire lip.

3) Wire Mesh: Welded at all intersections.

b. UL Classification: Straight sections 4” x 8”, 12”, and 18 inches.

c. Material: Carbon steel wire, ASTM A 510, Grade 1008. Wire welded, bent, and surface treated after manufacture.

d. Finish for Carbon Steel Wire: Finish applied after welding and bending of mesh.

1) Hot-Dip Galvanizing: ASTM A 123. (Only in exterior, wet or corrosive locations)

2) Flat Black: Powder painted surface treatment using ASA 61 black polyester coating. (In indoor dry locations)

e. Nominal Dimensions:

1) Nominal Mesh: 2 x 4 inches.

2) Nominal Straight Section Lengths: 80 inches and 118 inches.

3) Width: [6 inches] [8 inches] [12 inches] [18 inches] [24 inches].

4) Depth: Four inches in depth for all but 6” wide, which shall be 2” depth.

5) Wire Diameter: Nominal .177 inch, minimum.

f. Fittings: Field fabricated in accordance with manufacturer's instructions from straight sections.

g. Support System: Standard.

1) Wall Installation: CS Bracket. Maximum tray width of 12 inches (300 mm).

2) Trapeze Mounting to Ceilings: CS Profile. Maximum tray width of 18 inches (450 mm).

3) Ceiling Installation: CSC Bracket. Maximum tray width of 12 inches (300 mm).
4) Fasteners: As required by tray widths. To be furnished by manufacturer.

h. Hardware: Hardware, including splice connectors, grounding fittings and support components to be furnished by the manufacturer.

i. Grounding: GTA-2-2 grounding lugs for attachment on tray of continuous ground conductor fixing system.

(8) Examination

a. Examine areas to receive cable management system. Notify the Engineer of conditions that would adversely affect the installation or subsequent utilization of the system. Do not proceed with installation until unsatisfactory conditions are corrected.

(9) Installation

a. Install open wire mesh cabletray system at locations indicated on the drawings and in accordance with manufacturer's instructions.

b. Load Span Criteria: Install open wire mesh cabletray system in accordance with span load criteria of L/240.

c. Cutting:

1) Cut wires in accordance with manufacturer's instructions.

2) Cut wires with side action bolt cutters to ensure integrity of galvanic protective layer.

3) Cut each wire with 1 clean cut to eliminate grinding or touch-up.

d. Install open wire mesh cabletray system using hardware, splice connectors, support components, and accessories furnished by manufacturer.

e. Coordinate with other trades to provide as straight and accessible runs as possible. Not all offsets are shown on drawings, but Contractor shall make accessible offsets as required around ductwork, structure, piping or other interferences as required.

L. DUCT BANKS

(1) Duct banks are defined as a raceway or raceways installed in underground locations, enclosed in a steel-reinforced concrete envelope. They shall be installed where indicated on the drawings or otherwise required.

(2) All concrete used in duct bank construction shall be 3000 PSI minimum 28 day compressive strength unless otherwise noted, in accord with latest A.C.I. standards. Testing of concrete shall be the responsibility of the Contractor, as directed by the engineer. Place concrete against undisturbed earth, or provide forming as needed.

(3) Duct bank raceways shall receive a minimum of 3" concrete cover all sides. Minimum size of any duct bank shall be 12" x 12" square, in cross section. In all cases, local and national codes shall apply to duct bank construction where they exceed the requirements of this specification.

(4) Each corner of duct bank shall receive a minimum No. 4 steel reinforcing bar with 2" minimum concrete cover on all sides. Lap bars fifteen diameters at all splices. Provide stirrup bars bury 60” on center to tie bars together. Stirrups may be #3 bar. Reinforcing steel shall be rigidly supported during pour and vibration, and shall be constructed to ASTM standards.

(5) Support for encased raceways shall be as recommended by raceway manufacturer, spaced 8'-0" maximum on centers, rigidly fastened to prevent floating of ducts during concrete pours. Supports shall be of a material compatible with the raceway, and shall be of the interlocking type, forming a rigidly braced installation. Provide base type and intermediate type spacers to suit conduit configurations and sizes.

(6) Where rigid nonmetallic raceways leave concrete duct banks, a transition to rigid steel conduit shall be made 18" inside the concrete envelope. Under no circumstances shall PVC, EB or similar ducts exit concrete envelope, except where duct bank ties into a manhole wall. Provide bell ends at such terminations and dowel duct bank rebars 4" into manhole wall with non-shrink grout. Refer to details on drawings, as applicable. Slope all raceways within duct bank systems such that they shall drain into manholes or pull boxes. Provide proper drainage at manholes or pull boxes to prevent water accumulation.

(7) Where ducts transition thru manholes, pull boxes or at terminating end, each duct shall be specifically identified. A nomenclature as shown on the drawings or as agreed upon by the installer and engineer shall be utilized to identify each individual duct. A permanent means of identifying each duct, such as engraved lamacoid plates or stamped metal tags shall be used.

M. RACEWAY FITTINGS

(1) Raceway fittings (or condulets) shall be of gray iron, malleable iron or heavy copper-free cast aluminum. They shall be furnished in proper configurations, avoiding excessive plugged openings. Any openings that are left shall be properly plugged. All coverplates shall be gasketed with neoprene or similar approved materials, rated for the environment.

(2) Where required, raceway fittings shall be provided in explosion-proof configurations rated for the atmosphere. Place conduit seal off fittings at each device in accord with applicable codes. Seal off fittings shall be packed with wadding, and poured with an approved non-shrink sealing compound.

(3) Where conduit transitions in a run from a cold to a warm environment, (such as at a freezer, refrigerator or exterior wall) sealoff fittings shall be placed on the warm side immediately at the boundary to prevent migration of condensation within raceway systems.

(4) Expansion fittings shall be provided at all locations where conduits or other raceways cross over expansion joints. Provide copper ground bonding jumpers across expansion fittings.

(5) Conduit bodies, junction boxes and fittings shall be dust tight and threaded for dusty areas, weatherproof for exterior locations and vapor tight for damp areas. Conduit fittings shall be as manufactured by Crouse Hinds, Appleton, Killark or approved equivalent. All surface mounted conduit fittings as with "FS", "FD", "GUB" Types etc., shall be provided with mounting hubs.

(6) Where lighting fixtures, appliances or wiring devices are to be suspended from ceiling outlet boxes, they shall be provided with 3/4" rigid conduit pendants. Outlet boxes shall be malleable iron, provided with self-aligning covers with swivel ball joint and No. 14 gauge steel locking ring. Provide safety chain between building structure and ballast

housing of light fixtures for all fixtures, appliances or devices greater than 10 lbs weight. Fixtures shall be installed plumb and level.

(7) Fittings for threaded raceways shall be tapered thread with all burrs removed, reamed ends and cutting oil wiped clean.

(8) Fittings for E.M.T. conduit shall be of the compression type. Conduit stops shall be formed in center of couplings. All EMT connectors and couplings shall be of formed steel construction.

(9) Indentation or die-cast fittings shall not be permitted in any raceway system.

(10) All conduit fittings shall be securely tightened. All threaded fittings shall be engaged seven full threads. Fasteners shall be properly torqued to manufacturer's recommendations.

N. SUPPORTS AND HANGERS

(1) Supports and hangers shall be installed in accord with all applicable codes and standards. They shall be corrosion - resistant, galvanized or furnished with an equivalent protective coating. All electrical raceways shall be hung independently from the building structure with U.L. listed and approved materials. Hangers and supports depending on the support systems of other trades' work shall not be permitted, except with specific approval in writing from the Engineer. The use of tie wire for support or fastening of any raceway system is prohibited. Perforated metal tape shall not be used for raceway support.

(2) No raceway shall be installed on acoustic tile ceiling tees, or in any location that will impair the functioning, access or code-required clearances for any equipment or system.

(3) Supports for raceways shall be of materials compatible with the raceway, of malleable iron, spring steel, stamped steel or other approved material. Die-cast fittings are not permitted for supports.

(4) The installing contractor shall provide all necessary supports and braces for raceways, in a rigid and safe installation, complying with all applicable codes.

(5) Individual conduits run on building walls or equipment shall be secured by one hole galvanized malleable iron or stamped steel pipe strap or "minerallac" 2-piece straps. The straps are to be anchored by an approved means such as expansion anchors, toggle bolts, through bolts, etc. Where required by codes or other standards, provide spacers behind mounting clamps to space conduits off walls.

(6) Individual conduits run on building steel shall be secured by means of clamp supports similar and equal to those manufactured by the C.C. Korn Company, Elcen Co., B-Line or approved equivalent. Provide korn clamps, bulb tee clamps, flange clamps, beam clamps, "minerallacs", etc.

(7) Where feasible, vertical and/or horizontal runs of conduit shall be grouped in common hangers on "trapezes" of channel stock as manufactured by "Unistrut" or equivalent, 1-5/8" minimum depth, 12 gauge. Utilize conduit clamps appropriate to the channel.

(8) Channel strut systems for supporting electrical equipment or raceways in outdoor wet or corrosive locations shall be constructed of 12 gauge minimum hot dip galvanized steel with 9/16" diameter holes on 8" centers, with finish coat of paint as manufactured by Unistrut, B-Line, Kindorf, or approved equivalent. In indoor dry locations, factory finish paint will be acceptable.

(9) The minimum diameter of round all-thread steel rods used for hangers and supports shall be 1/4", 20 threads per inch. All-thread rod shall be furnished with a corrosion-resistant finish.

(10) Welding directly on conduit or fittings is not permitted.

(11) Provide riser support clamps for vertical conduit runs. Riser support clamps shall be of heavy gauge steel construction. Install riser support clamps at each floor level penetration, or as otherwise required.

(12) Provide conduit cable support clamps for vertical conductor runs as required or indicated on plans. Clamps to be insulating wedging plug, with malleable iron support ring. Install within properly sized and anchored junction box.

(13) Spring steel clips and fittings such as those manufactured by HITT-Thomas, Caddy-Erico, or approved equivalent, with black oxide finish are permitted in any indoor dry location for concealed work, where acceptable to the local authority having jurisdiction.

3. INSTALLATION

A. This Contractor shall lay out and install all conduit systems so as to avoid any other service or systems, the proximity of which may prove injurious to the conduit, or conductors which it confines. All conduit systems, except those otherwise specifically shown to the contrary, shall be concealed in the building construction or run above ceilings. Size of all conduit shall as a minimum conform to the National Electrical Code, unless larger size is indicated on the Contract Drawings.

B. No conduit larger than ¾” shall be installed in poured concrete slabs except with permission of the structural engineer. All other shall be held below slab. Conduit shall be held at least 6" from flues or hot water pipes.

C. All exposed conduit shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of cast metal fittings or symmetrical bends unless otherwise shown. All conduit shall have supports spaced not more than eight feet apart.

D. Conduit shall be installed in such a manner so as to insure against collection of trapped condensation. All runs of conduit shall be arranged so as to be devoid of traps. Trapped conduit runs shall be provided with explosion proof drains at low points. Runs of conduit between junctions shall not have more than the equivalent of three 90º bends.

E. Junction boxes shall be installed so that conduit runs will not exceed 85', or as shown on the Contract Drawings.

F. Junction boxes, troughs, pull boxes or similar shall contain no more than three circuits. If boxes containing more circuits are deemed necessary for special circumstances such as fit or coordination, the Contractor shall contact the Engineer for written direction.

G. Underground electric, cable TV, telephone service or other rigid steel conduit and underfloor rigid steel conduit below the concrete floor slab shall be painted with two coats of bitumastic paint, such as "Asphaltum".

H. All underground or underfloor conduits shall be swabbed free of all moisture and debris before conductors are pulled.

I. At least two 1 inch and four 3/4 inch conduits shall be stubbed from flush-mounted panelboards into the nearest accessible area for future use. Provide suitable closures for these stubs. Identify each stub with a suitable hang tag.

J. Install electrical raceways in accordance with manufacturer's written instructions, applicable requirements of latest edition of the N.E.C., and NECA "Standard of Installation", complying with recognized industry practices.

K. Coordinate with other trades, including metal and concrete deck trades, as necessary to interface installation of electrical raceways and components.

L. Level and square raceway runs, and install at proper elevations and required heights. Hold tight to structure or route through joists webbing wherever possible, to maximize available space and not restrict other trades.

M. Complete installation of electrical raceways before starting installation of cables or wires within raceways.

N. All underground conduits shall be buried to minimum depth of 24" from the top of the concrete encasement or raceway to finished grade, unless otherwise noted on plans. Observe minimum burial requirements of local utility company where their standards or regulations apply. Conduits containing primary power conductors, (higher than 600 volts to ground) shall be 42" to top below finished grade, unless otherwise noted on plans.

O. All raceways shall be installed to maintain a minimum of 4” clearance below roof decking.

4. SPECIALTIES

A. All EMT terminations at junction boxes, panels, etc. shall be made with case hardened locknuts and appropriate fittings, with insulated throat liners. Insulating terminations shall be manufactured as a single unit. The use of split sleeve insulators is not permitted.

B. All rigid conduit, except main and branch feeders, shall have heavy fiber insulating bushings reinforced with double locknuts. All branch and main feeders shall have insulated bushings with grounding lugs and shall be bonded to enclosures with appropriately sized copper jumpers, except at pad mounted transformers. Bonding jumpers shall be installed as required by the N.E.C. and other applicable codes.

C. All conduit stubbed through floor during construction shall have openings protected with plastic caps approved for this purpose. Connections on both ends of all flexible conduit shall be equivalent to Thomas and Betts, Ideal, Appleton, Efcor, or approved equivalent, rated for the environment.

D. All pulling lines left in open conduit systems shall be non-metallic, left securely tied off at each end.

E. Where spare raceways terminate in switchboards or motor control centers a fish tape barrier shall be provided.

END OF SECTION 26 05 33

SECTION 26 05 53 - IDENTIFICATIONS

1. GENERAL

A. Equipment, disconnect switches, motor starters, pushbutton stations, special device plates, and similar materials shall be clearly marked as to their function and use. All disconnecting means shall be marked to indicate the panel and circuit number of the power source. Markings shall be applied neatly and conspicuously to the front of each item of equipment with 1/2" white lamacoid plate (or equivalent) with black (or red for emergency power) letters 1/4" high.

B. The Contractor shall provide clearly legible typewritten directories in each electrical panel indicating the area, item of equipment, etc., controlled by each switch, breaker, fuse, etc. These directories are to be inserted into plastic card holders in each panel. The Contractor shall be required to demonstrate the accuracy of the panel directory for a random sampling of circuits in each panelboard as directed in the field by the Engineer with corrections made immediately so it is imperative that care be taken during installation to insure 100% accurate directories.

(1) Room numbers shall match the final numbering as indicated by building signage and owner-approved numbering scheme.
(2) The contractor shall provide electronic copies of all final schedules in Excel or Word format at project closeout.

C. All circuit breakers and disconnects serving fire alarm equipment shall be painted red and clearly labeled as Fire Alarm Circuits.

D. Branch circuit panelboards and switch gear shall be provided with a white lamacoid plastic plate with 1/2" black (or red for emergency power) letters for panel designation and 1/4" letters showing voltage and feeder information. Branch circuit switches shall be designated as to function. Panelboard and switchgear labels shall indicate the source they are fed from, and the circuit number at that source. Panelboards shall also indicate color coding of the branch circuit phase conductors supplied. Clearly indicate the exact label legend to be furnished with each panelboard and switchgear on the shop drawings for each item of equipment prior to submission of shop drawings.

EXAMPLE:

PANEL “XYZ”
FED FROM “MDP – 2”
120/ 208/ 3PH/ 4W – 225A
BLACK-RED-BLUE
CONDUCTORS

E. Where branch circuit panelboards and switchgear are connected to an emergency source, the lamacoid plate shall be red, and the word "emergency" shall be incorporated into the

legend. In healthcare applications, the NEC – designated branch (life safety, critical or equipment branch) shall also be incorporated into the legend, all in ¼" letters. Also provide similar plates and legends for automatic transfer switches, and equipment disconnects 100 amps and larger.

F. Lamacoid plates shall be located at center of top of trim for branch circuit panels, switch gear, and centered at side for branch circuit switches. Fasten with self-tapping stainless-steel screws or other approved method.

G. The building service disconnect(s) shall be marked with the maximum available fault current available at that location in accordance with NEC Article 110. If a fault current study is not required by this contract, the Contractor shall obtain fault current availability data from the utility company. This requirement applies to both new and existing services if any distribution equipment is changed.

H. All receptacles and light switches shall be labelled with the circuit number. Labelling shall be by printed adhesive label with clear background and black capitalized 3/16" high lettering.

I. All disconnects, enclosed breakers, motor starters and VFDs shall be labelled with the supplying circuit number. Markings shall be applied neatly and conspicuously to the front of each item of equipment with 1/2" white lamacoid plate (or equivalent) with black (or red for emergency power) letters 1/4" high.

J. All fire alarm and security addressable devices shall be labelled with their unique address. Labelling shall be by printed adhesive label with clear background and black capitalized 3/16" high lettering.

END OF SECTION 26 05 53

SECTION 26 24 00 - ELECTRICAL DISTRIBUTION EQUIPMENT

1. GENERAL

   A. All electrical distribution equipment shall be dead front UL listed for the purpose and application. All equipment shall meet or exceed all applicable requirements of the National Electrical Code (N.E.C.). Any device or component, i.e., switchboard, panel, breaker, switch, etc., used as service entrance equipment, shall be listed for use at 100% of the rated capacity.

2. DISTRIBUTION PANELBOARDS (600 AMPERE OR GREATER)

   A. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67. Cabinets to be equipped with latch and tumbler-type lock on door of trim. Doors over 48" long shall be equipped with three-point latch and vault lock. All locks shall be keyed alike. End walls shall be removable. Fronts shall be of code gauge steel, with gray baked enamel finish electrodeposited over cleaned, phosphatized steel.

   B. The panelboard interior assembly shall be dead front with panelboard front removed. Main lugs or main breakers shall have barriers on five sides. The barrier in front of the main lugs shall be hinged to a fixed part of the interior. The end of the bus structure opposite the mains shall have barriers. Bus structure shall be full height of panel.

   C. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the panelboard schedule. Such ratings shall be established by heat rise tests with maximum hot spot temperature on any connector or bus bar not to exceed 50ºC. rise above ambient. Heat rise tests shall be conducted in accordance with Underwriters Laboratories Standard UL 67. The use of conductor dimensions will not be accepted in lieu of actual heat tests. All panelboards unless otherwise noted shall have space to accept forty-two 20 amp one pole circuit breakers.

   D. Circuit breakers shall be equipped with individually insulated, braced and protected connectors. The front faces of all circuit breakers shall be flush with each other. Large, permanent, individual circuit numbers shall be affixed to each breaker in a uniform position. Tripped indication shall be clearly shown by the breaker handle taking a position between "ON" and "OFF." Provisions for additional breakers shall be such that no additional connectors will be required to add breakers. All panelboards shall be capable of accepting 225 amp 3 pole branch breakers as a minimum unless otherwise noted.

   E. Each panelboard, as a complete unit, shall have a short circuit current rating equal to or greater than the integrated equipment rating shown on schedules on the plans or as determined by verification with local utility company. This rating shall be established by testing with the overcurrent devices mounted in the panelboard. The short circuit tests on the overcurrent devices and on the panelboard structure shall be made simultaneously by connecting the fault to each overcurrent device with the panelboard connected to its rated

voltage source. Method of testing shall be per Underwriters Laboratories Standard UL 67. The source shall be capable of supplying the specified panelboard short circuit current or greater. Testing of panelboard overcurrent devices for short circuit rating only while individually mounted is not acceptable. Also, testing of the bus structure by applying a fixed fault to the bus structure alone is not acceptable. Panelboards shall be marked with their maximum short circuit current rating at the supply voltage and shall be UL listed.

F. Arc Flash Hazard warning labels shall be affixed to all panelboards in accordance with Article 110.16 of the National Electrical Code. All components protected by a manually operated arc energy reduction means shall have an additional label affixed that describes the location of the energy reduction means.

G. Provide energy reducing maintenance switch with local status indicator for any breaker or equipment rated or adjustable to 1,200 Amps or greater.

H. Distribution panelboards shall be Square "D", G.E., Siemens, Eaton/Cutler–Hammer or approved equivalent.

I. Lockable breakers shall be provided for all breakers serving all HVAC equipment, Plumbing equipment, and kitchen appliances.

3. BRANCH PANELBOARDS

A. This section covers lighting and power panelboards (refer to schedules, notes on Drawings and the Electrical One-Line Diagram, of the Contract Drawings).

B. All panelboards shall be of the circuit breaker type and shall be of one manufacturer.

C. Branch panelboards shall be as indicated on the drawings and as specified herein. The lighting panelboards shall be of the dead-front, quick-make, quick-break, plug-in circuit breaker type, with trip indicating and trip free handles. All circuits shall be clearly and properly numbered and shall be provided with thermal magnetic protection. The panelboards shall be enclosed in code gauge, galvanized steel cabinets with smooth finished hinged doors without visible external fasteners and heavy chrome locks. Locks shall all be keyed alike. Each door shall have a directory card inside, covered with a plastic shield, filled in with black India ink or typewritten with circuit numbers and description indicated. Room numbers shall be coordinated with final room numbers as selected by Owner -- not numbers on Contract Documents.

Special Note: The room numbers used to fill out the panel directories shall match the actual final name and numbering scheme selected by the Owner. They shall not be filled out per the construction drawing numbering scheme, unless the Contractor is directed to do so by the Architect or Engineer.

D. Branch panelboards shall be surface or flush mounted as indicated on the Contract Drawings.

E. Circuit breakers for 120/208 volt systems shall be of 10,000 A.I.C. RMS symmetrical rating unless otherwise indicated on the Contract Drawings. For 277/480 volt systems, provide circuit breakers with 14,000 A.I.C. ratings unless otherwise indicated.

F. All main bus and connections thereto in branch panelboards shall be copper. All bus bars shall extend full length of panelboards.

G. All circuit breakers used to switch lights shall be SWD (switching duty) rated and U.L. listed for the purpose.

H. Where required by the National Electrical Code, provide branch arc-fault circuit interrupters (A.F.C.I.'s) in branch panelboards, whether indicated on the panel schedule or not. They shall be U.L. listed, latest edition.

I. Where branch circuit breakers feed hermetically, sealed compressor for cooling or refrigeration equipment, provide U.L. listed H.A.C.R.-style circuit breakers.

J. Where branch circuit breakers are indicated or required to be ground-fault circuit-interrupting type (G.F.C.I.), they shall have test and reset buttons and be U.L. listed, latest edition. Do not share neutrals with other circuits.

K. Where branch circuit breakers are feeding H.I.D. (high-intensity-discharge) loads, they shall be rated and listed for such loads. Provide proper circuit breaker whether indicated on panel schedules or not.

L. Arc Flash Hazard warning labels shall be affixed to all panelboards in accordance with Article 110.16 of the National Electrical Code. All components protected by a manually operated arc energy reduction means shall have an additional label affixed that describes the location of the energy reduction means.

M. Panels shall be Square "D", G.E., Siemens, Eaton/Cutler-Hammer or approved equivalent.

N. Lockable breakers shall be provided for all breakers serving all HVAC equipment, Plumbing equipment, and kitchen appliances.

4. INSTALLATION INSTRUCTIONS

A. Panelboards with circuit breakers installed before the building has been finished and cleaned shall be masked.

B. All dust and debris shall be removed from the panels before they are energized and placed in service.

C. All panelboard fronts shall be omitted until final punch list inspection is made. Directories for each panelboard shall be completed and available for review by the Engineer at that time.

D. All service equipment shall be marked with the maximum available fault current and the date of the calculation. This information shall be obtained in writing from the serving utility.

Provide label adjacent to the service disconnecting means. Document action of the fault current shall be included in the operation and maintenance manual. This labeling shall be provided for all new service installations, service upgrades, and any project that adds or replaces distribution panels or branch panel boards.

E. Where applicable - Provide a warning sign on the service entrance equipment indicating type and location of all on-site emergency power sources in accordance with the NEC.

F. Where applicable – Provide warning sign(s) for alternative power devices (photovoltaic, wind, fuel cell, etc.) on all equipment in accordance with the NEC.

G. All emergency system switchgear, distribution panels and branch panelboards shall be provided with surge protection devices in accordance with the NEC. Refer to Section 264313 Surge Suppression Systems.

5. SAFETY SWITCHES

A. Provide heavy duty safety switches as a final disconnecting means as required by NEC and/or as indicated on the Contract Drawings.

B. All safety switches shall be NEMA Type 1, NEMA 3R, NEMA 4 stainless steel, NEMA 12, or as required by the operating environment, Heavy Duty Type HD, UL listed.

C. All safety switches shall have switch blades that are fully visible in the "OFF" (open) position with the door open.

D. All current carrying parts shall be plated by an electrolytic process to resist corrosion and to promote cooling.

E. Switch mechanism shall be quick-make, quick-break, load break rated, such that during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing and opening action of the contacts has started. The handle and mechanism shall be an integral part of the box (not cover) with facilities for pad locking in the open or closed position with up to three padlocks. Switch doors shall be interlocked with switch handle so that the door can only be opened when the switch is in the "OFF" (open) position.

F. Arc Flash Hazard warning labels shall be affixed to all switches in accordance with Article 110.16 of the National Electrical Code. All components protected by a manually operated arc energy reduction means shall have an additional label affixed that describes the location of the energy reduction means.

G. Switches shall be as manufactured by Square D., G.E., Siemens, Eaton/Cutler-Hammer or approved equivalent.

6. FUSES

A. Upon completion of the building, the Contractor shall provide the owner with spare fuses as shown below. All fuses shall be Bussmann, Shawmut, Gould or Reliance.

(1) 10% (minimum of 3) of each type and rating of installed fuses shall be supplied as spares:

(2) Bussmann spare fuse cabinets - Catalog No. SFC - shall be provided to store the above spares.

B. No fuses shall be installed in the equipment until the installation is complete, including tests and inspections required prior to being energized. All fuses shall be of the same manufacturer to ensure retention of selective coordination, as designed.

C. Circuits 601 to 6000 amperes shall be protected by current limiting BUSSMANN HI-CAP TIME DELAY FUSES KRP-C. Fuses shall employ "O" rings as positive seals between the end bells and the fuse barrel. Fuses shall be a time-delay type and must hold 500% of rated current for a minimum of 5 seconds, clear 20 times rated current in .01 seconds or less and be listed by Underwriter's Laboratories, Inc., with an interrupting rating of 200,000 amperes R.M.S. symmetrical. The fuses shall be UL Class L.

D. Circuits 0 to 600 amperes shall be protected by current limiting BUSSMANN LOW-PEAK Dual Element Fuses, LPN-RK (250 volts) or LPS-RK (600 volts). All dual element fuses shall have separate overload and short circuit elements. Fuse shall incorporate a spring activated thermal overload element having a 284°F melting point alloy and shall be independent of the short-circuit clearing chamber. The fuse shall hold 500% of rated current for a minimum of l0 seconds and be listed by Underwriters Laboratories, Inc. with an interrupting rating of 200,000 amperes r.m.s. symmetrical. The fuses shall be UL Class RK1.

E. Motor Circuits - All individual motor circuits rated 480 amperes or less shall be protected by BUSSMANN LOW PEAK DUAL-ELEMENT FUSES LPN-RK (250 volts) or LPS-RK (600 volts). The fuses for 1.15 service factor motors shall be installed in rating approximately l25% of motor full load current except where high ambient temperatures prevail, or where the motor drives a heavy revolving part which cannot be brought up to full speed quickly, such as large fans. Under such conditions the fuse should be 150% to 200% of the Type KRP-C HI-CAP Time Delay Fuses of the rating shown on the drawings. 1.0 service factor motors shall be protected by BUSSMANN LOW-PEAK Dual-Element Fuses LPN-RK (250 volts) or LPS-RK (600 volts) installed in rating approximately 115% of the motor full load current except as noted above. The fuses shall be UL Class RK1 or L.

F. Circuit breaker panels shall be protected by BUSSMANN LOW-PEAK Dual Element fuses LPN-RK (250 volts) or LPS-RK (600 volts) as shown on the drawings. The fuses shall be UL Class RK1.

7. DISTRIBUTION TRANSFORMERS

A. The Contractor shall provide dry-type transformers as manufactured by Square "D", G.E., Siemens, Eaton/Cutler-Hammer or equivalent. KVA ratings shall be as indicated on the electrical plans and shall have copper windings.

B. Three phase transformers are to have 480 volt Delta primary and 120/208V/3Ø/4W secondary. 30 KVA transformers and larger are to be supplied with 2-22% full capacity taps above and (4) 2-1/2% full capacity taps below primary voltage. Exceptions to the above will be shown on the electrical plans.

C. Transformers 30 KVA and above shall be Class H, 115°C. and shall have the ability to carry a continuous 15% overload without exceeding a 115°C rise above 40° ambient.

D. Transformer coils shall be vacuum impregnated with non-hygroscopic, thermosetting varnish. Each layer shall have end fillers or tie downs to provide maximum mechanical strength. Insulation systems and their construction techniques shall be listed by Underwriters Laboratories.

E. Transformer coils shall have a final wrap of electrical insulating material designed to prevent injury to the coil wire. Transformers having coils with magnet wire visible will not be acceptable.

F. All cores to be manufactured from a high grade, non-aging, silicon steel with high magnetic permeabilities, low hysteresis and eddy current losses. Magnetic flux densities are to be kept well below saturation to allow for a minimum of 10% over voltage excitation. The cores shall be clamped with structural angles (formed angles not acceptable) and bolted to the enclosure to prevent damage during shipment or rough handling.

G. The core and coil unit shall be completely isolated from the enclosure by means of a vibration isolating system and shall be so designed as to provide for continual securement of the core and coil unit to the enclosure. Sound isolating systems requiring the removal of all tie down facilities will not be acceptable.

H. Transformers 15 KVA thru 45 KVA shall be provided with interchangeable mounting for floor or wall.

I. The maximum top of case temperature shall not exceed 35°C above ambient.

J. The entire transformer enclosure shall be degreased, cleaned, phosphatized, primed and finished with baked enamel.

K. The core and coils shall be visibly grounded to the frame of the transformer cubicle by means of a flexible grounding strap of adequate size.

L. Sound levels shall be guaranteed by the manufacturer and substantiated by certified tests on each unit furnished. The sound levels are not to exceed the following values: 10 to 45 KVA, 42 D.B. to 150 KVA; 45 D.B., 225 to 300 KVA; 50 D.B. and 500 KVA, 54 D.B.

M. If a particular “K” rating is specified for a dry-type transformer, that rating shall be provided.

N. Transformers shall be as manufactured by Square D, G.E., Eaton/Cutler-Hammer, Siemens, Niagara or approved equivalent.

8. CONTACTORS

A. General

(1) Contactors shall be continuously rated at the specified amperes per pole for all types of ballast and tungsten lighting, resistance and motor load. Contactors shall have totally enclosed, double-break silver-cadmium-oxide power contacts. Auxiliary arcing contacts will not be acceptable. Contact inspection and replacement shall be possible without disturbing line or load wiring. Contactors shall have straight-through wiring with all terminals clearly marked. Contactors shall have a gasketed NEMA Type 1 (NEMA 12 for electrically held) enclosure, unless otherwise noted or required.

(2) Contactors shall be approved per UL 508 and/or CSA and be designed in accordance with NEMA Standards. They shall be industrial duty rated for applications to 600 volts maximum. I.E.C.-style contactors are not acceptable.

(3) Contactors shall have provisions for factory or field addition of:

a. Four N.O. or N.C. auxiliary contacts rated 6 amperes continuous at 600 volts.

b. Single or double circuit, N.O. or N.C., 30 or 60 ampere 600 volt power-pole adder.

c. Control-circuit fuse holder, one or two fuses.

d. 0.2-60 second adjustable interval timer attachment, if so indicated on plans.

e. Transient-suppression module for coil control circuit. Coil control to be 120 volts. Provide circuit or step-down transformer.

B. Electrically Held Lighting Contactors

(1) Contactor coils shall be continuously rated and encapsulated, 120 volt rated. Enclosures shall be NEMA 12, to minimize noise transmission.

C. Mechanically Held Lighting Contactors

(1) Coil-clearing contacts shall be supplied so that the contactor coils shall be energized only during the instance of operation. Both latch and unlatch coils shall be encapsulated. Coils shall be rated for 120 volt operation.

(2) Lighting contactors shall be Square D Class 8903 or equivalent by G.E., Siemens, Eaton/Cutler-Hammer or Allen-Bradley.

END OF SECTION 26 24 00

SECTION 26 27 26 - WIRING DEVICES AND PLATES

1. GENERAL

A. This section of the specifications includes wiring devices, cover plates, weatherproof and dust-tight closures, communications devices and floor outlets.

B. Wiring devices are listed by manufacturer and catalog numbers to establish the quality and type required. Equivalent devices of other manufacturers will be acceptable with prior approval of the Engineer. Submit cutsheets and/or samples of each type ten days prior to bid date for review and written approval to bid. Insofar as possible, standard application or special application devices shall be by one manufacturer.

4. MATERIALS

TYPE

RATING

CONFIGURATION

COLOR

VENDOR - CAT. #

RECEPTACLE - DUPLEX

COMMERCIAL GRADE

125V, 20A

125V, 15A

NEMA 5-20R

NEMA 5-15R

!

!

HUBBELL CR5362*
GE 5362*

LEVITON 5362*
HUBBELL CR5262**
GE 5262**
LEVITON 5262**

* USE WHEN ON DEDICATED 20A CKT., OR CALLED OUT
** USE WHEN ON DEDICATED 15A CKT., OR WHEN MORE THAN ONE RECEPTACLE ON A CIRCUIT

* USE WHERE ON DEDICATED 20A CKT., OR CALLED OUT
** USE WHERE ON DEDICATED 15A CKT., OR WHERE MORE THAN ONE RECEPTACLE ON A CIRCUIT

RECEPTACLE - DUPLEX G.F.I. (SHALL MEET U.L. 943 STANDARD)

125V, 20A

NEMA 5-20R

!

HUBBELL GFR5352A

RECEPTACLE - SIMPLEX

125V, 20A

NEMA 5-20R

!

HUBBELL 5361

RECEPTACLE - DUPLEX, SAFETY TYPE (WITH TAMPER-RESISTANT SCREWS)

125V, 20A

NEMA 5-20R

!

HUBBELL HBL-8300-SG

RECEPTACLE - DUPLEX, SAFETY TYPE (WITH TAMPER-RESISTANT SCREWS)

125V, 15A

NEMA 5-15R

!

HUBBELL HBL-8200-SG

RECEPTACLE,
DUPLEX NEON PILOT FACE-RED

125V, 15A

NEMA 5-15R

!

HUBBELL 5262-LHR
GE 5362-LHR
LEVITON 5362-LHR

RECEPTACLE, SIMPLEX WITH CLOCK HANGER TAB, STAINLESS STEEL PLATE

125V, 15A

NEMA 5-15R

METAL

HUBBELL 5235
LEVITON 658-BR
ARROW-HART 5760

RECEPTACLE, DUPLEX RED COLOR NYLON FACE (FOR EMERGENCY POWER OUTLETS)

125V, 20A

NEMA 5-20R

RED

HUBBELL 5352-RDB
GE 5362-RDB
LEVITON 5362-RDB

RECEPTACLE, DUPLEX ISOLATED GROUND WITH SURGE SUPPRESSION, INCLUDING INDICATOR LIGHT

125V, 15A

NEMA 5-15R

BLUE DEVICE

HUBBELL 5250S
LEVITON 5380
ARROW-HART 5362

RECEPTACLE, SINGLE

250V, 20A

NEMA 10-20R

BLACK

HUBBELL 6810
GE 4124
LEVITON 5032

RECEPTACLE, SINGLE

250V, 30A

NEMA 6-30R

BLACK

HUBBELL 9330
GE 4139
LEVITON 5372

RECEPTACLE, SINGLE

250V, 50A

NEMA 6-50R

BLACK

HUBBELL 9367
GE 4141
LEVITON 5374

SWITCH, SINGLE POLE

120/277V, 20A

SPST

!

HUBBELL HBL-1221
GE 5951
LEVITON 1221

SWITCH, SINGLE POLE - RED TOGGLE (WITH RED COVER PLATE, FOR EMERGENCY LIGHTING CONTROL)

120/277V, 20A

SPST

RED

HUBBELL HBL-1221-RDB
GE 5951-RDB
LEVITON 1221-RDB

SWITCH, THREE-WAY

120/277V, 20A

3-WAY

!

HUBBELL HBL-1223
GE 5953
LEVITON 5953

SWITCH, FOUR-WAY

120/277V, 20A

4-WAY

!

HUBBELL HBL-1224
GE 5954
LEVITON 5954

SWITCH, KEYED

120/277V, 20A

SPST

N/A

HUBBELL HBL-1221-L
GE 5951-L
LEVITON 1221-L

SWITCH, KEYED

120/277V, 20A

3-WAY

N/A

HUBBELL HBL-1223-L
GE 5953-L
LEVITON 1223-L

SWITCH, KEYED

120/277V, 20A

4-WAY

N/A

HUBBELL HBL-1224-L
GE 5954-L
LEVITON 1224-L

NOTE:
SWITCH, KEYED TO EACH BE FURNISHED WITH ONE HUBBELL #1209 KEY. TURN OVER TO OWNER AT CLOSE OF PROJECT AND OBTAIN RECEIPT FOR VERIFICATION THAT KEYS HAVE BEEN DELIVERED.

SWITCH, MOMENTARY, 3-POSITION, CENTER OFF SWITCH, PILOT (TOGGLE LIT IN OFF POSITION)

120/277V, 20A (VERIFY VOLTAGE USED)

SPDT

!

HUBBELL HBL SERIES
GE EQUIVALENT
LEVITON EQUIVALENT

SWITCH, PILOT (TOGGLE LIT IN OFF POSITION)

120/277V, 20A (VERIFY VOLTAGE USED)

SPDT OR AS NOTED

CLEAR "LEXAN"

HUBBELL HBL SERIES
GE EQUIVALENT
LEVITON EQUIVALENT

SWITCH, PILOT (TOGGLE LIT IN ON POSITION)

120/277V, 20A (VERIFY VOLTAGE USED)

SPST OR AS NOTED

CLEAR "LEXAN"

HUBBELL HBL-PL7 SERIES
GE EQUIVALENT
LEVITON EQUIVALENT

TIMER SWITCH

120V

SPST, 15 MINUTE

!

NUTONE VS63
GE EQUIVALENT
LEVITON EQUIVALENT

NOTES:

1. PROVIDE MATCHING CAP (PLUG) FOR ALL RECEPTACLES 30 AMP RATED AND ABOVE AS REQUIRED FOR EQUIPMENT.

2. ALL RECEPTACLES SHALL BE BACK OR SIDE-WIRED, CLAMPING TYPE

5. FOR DRYERS AND RANGES, PROVIDE 3-POLE GROUNDING TYPE AS REQUIRED BY DEVICE. LOCATE DEVICE SO THAT DRYER OR RANGE CAN BE PUSHED TIGHTLY AGAINST WALL.

6. RECEPTACLES SHALL BE TAMPER RESISTANT AND WEATHER RESISTANT AND MARKED ACCORDINGLY AS REQUIRED BY N.E.C.

7. ALL RECEPTACLES INSTALLED IN DAMP OR WET LOCATIONS SHALL BE UL LISTED WEATHER RESISTANT TYPE.

! SEE ARTICLE 3, COLOR.

A. SMALL MOTOR CONTROL SWITCHES

For small line-to-neutral motor loads of 3/4 HP or less, single phase, rated at 120 or 277 volts, provide snap-type, H.P. rated motor starter switch with thermal overloads. Overload heaters sized to match the motor nameplate amperes and the ambient temperature shall be provided. Provide with NEMA 1, NEMA 3R or other enclosure suitable for the location and atmosphere. All manual starters in finished areas shall be in flush-mounted enclosures.

B. EMERGENCY RELAY

(1) Description: NC, electrically held relay, arranged for wiring in parallel with manual or automatic switching contacts; complying with UL 924.
(2) Coil Rating: 120 V.
(3) Energize lighting indicated on any loss of utility power.

3. COLOR

A. Color of devices shall be as selected by the architect. Samples (devices, plates or both) may be required to be submitted with other architectural color items by the Contractor. The Contractor shall coordinate any such submission required with other trades, the Prime Contractor or as needed.

B. Where devices are controlling or supplying emergency power from a standby source, the device color shall be red, as with switch toggles or receptacle fronts. Plate color shall match others on normal power in the building unless otherwise noted.

C. Where surface finishes next to the devices vary in color or shade throughout the project, the Contractor may be required to provide lighter or darker plates and devices to more closely match wall finishes. These variations are considered to be included in the original contract for construction.

4. PLATES AND COVERS

A. Unless otherwise specified or noted, all wiring device plates and covers shall be smooth thermoplastic, Hubbell "P" Series or equivalent G.E. or Leviton. Color shall match device unless otherwise indicated.

B. All kitchen, gymnasium or food service area plates shall be bright finish 302 stainless steel.

C. Cover plates shall be of one manufacturer insofar as possible.

D. Weatherproof plates for G.F.C.I. receptacles shall be cast aluminum, self-closing, gasketed, suitable for standard box mounting, U.L. listed for wet location use, cover closed. Vertical mounting - Hubbell WP26M, horizontal mounting - Hubbell WP26MH (die-cast zinc) or equivalent Leviton or G.E.

E. Weatherproof switch plates for toggle-handle switches shall be clear silicone rubber, for standard outlet boxes. Hubbell 1795 or equivalent G.E. or Leviton.

F. Cover plates for computer, telephone or other system outlets shall be as required to meet supplier or the owner's requirements, as applicable. Color to match other plates on project. Furnish telephone plates with wall-mounting studs if mounted at 48" or higher. See devices schedule below.

5. COMMUNICATIONS DEVICES AND PLATES

A. Communications devices and wall plates furnished for this project shall all be standard products, of the same manufacturer. They shall consist of a wall plate bezel, capable of holding snap-in devices as indicated.

B. Color of communications wall plates shall match the color of all other plates furnished on the project, matching switch, receptacles, etc. Verify all color selections with the Architect.

C. The color of communications wall plate snap-in inserts shall be as noted herein, or shall be per the owner's standards, if applicable. Verify color requirements prior to ordering any materials.

D. Provide securely-fastened permanent labels in the faceplate of communications wall plates that clearly and legibly indicate the address or unique identifier for an individual jack.

E. All communications wall plates shall be provided with a bezel capable of holding a minimum of four separate device inserts, unless otherwise noted. Provide blank inserts to close any unused positions, of a color to match the plate.

F. Communications wall plates and devices shall be as manufactured by Panduit, Lucent Technologies, Leviton, AMP or approved equivalent.

DEVICE INSERT SCHEDULE

Multimode Fiber Optic
(Always Install in Pairs)

FDDI - Compatible
62.5/125µ, ST-Style
Grey Color, Female (2 fibers terminated)

Ethernet Network Data

Category 5 - Enhanced or Category 6, 8 Pos/4 Pair Blue Color
RJ-45, EIA/TIA 568AB (4 pairs terminated)

Voice Circuits
4 Pair

Category 5 - Enhanced or Category 6, 8 Pos/4 Pair
White Color
RJ-45, EIA/TIA 568B (4 pairs terminated)

Fiber Optic
2 Strands

"SC"-Style Connectors Mounted in Adjacent Pairs - Black Color

Voice Circuits
2 Pair

Category 3, 4 Pos/2 Pair
Green Color
RJ-11 (2 Pairs Terminated)

Video Circuits

"F" Connector
Bulkhead Style
White Color (RG-6 coax termination)

Blank Cover

Color to Match Wall plate

Wall Plate (4-Port/1 Gang)

Color to Match Wiring Devices
Used in Adjacent Areas

Special Comm. Port for T-1
and Special Communication Circuits

Orange Color
RJ-31X, 8 Pos/4 Pairs Terminated

6. STANDARD SINGLE-SERVICE FLOOR BOXES

A. In general, floor boxes to be used flush in concrete floors shall be of single-gang stamped steel construction, round, deep style, fully adjustable Hubbell B-2537 Series, Type 1 or equivalent.

B. Where multiple gangs are indicated on the plans (or elsewhere), multi-gang (up to 3 yokes maximum) stamped steel, rectangular, deep style units shall be used. They shall be fully adjustable, Hubbell B-2432 Series, Type 1, or equivalent. Multiple-gang boxes shall be provided with removable partitions between each section in accord with N.E.C., where power and non-power circuits enter the same box.

C. In general, all cover plates for floor boxes shall be flush, solid brass. Provide typical plates as listed:

Duplex Outlet - Round, Duplex Flap - Hubbell S-3925
- Rectangular, Duplex Flap - Hubbell S-3825

Telephone or Data - Round, Combination 1" or 2 1/8" - Hubbell S-2725
-Rectangular, Combination 1" or 2 1/8" - Hubbell S-2625

D. Furnish floor boxes with threaded hubs as required to suit conduit routings, 3/4" minimum.

E. Furnish carpet flanges for all boxes installed in carpeted areas. Flanges to be clear polycarbonate plastic, round - Hubbell S-3079 or rectangular, for gangs indicated - Hubbell S-308 Series or equivalent.

F. Floor outlet boxes shall be installed dead level flush with wood, VCT, concrete or other hard surface type floor. Furnish special stop trims for terrazzo where required.

G. Outlets within floor boxes shall be as specified elsewhere in these specifications.

7. INSTALLATION

A. All wiring devices in dusty areas, exposed to weather and moisture shall be installed in Type "FS" or similar conduit fittings having mounting hubs, with appropriate cover plates.

B. Devices that have been installed before painting shall be masked. No plates or covers shall be installed until all finishing and cleaning has been completed.

C. Provide G.F.C.I. duplex feed-thru style receptacles in accordance with new U.L. Standard 943 where indicated or required by the National Electrical Code, whether specifically called out or not. When a G.F.C.I. receptacle is on a circuit with other non-G.F.C.I. receptacles, it shall always be placed at the homerun point of the circuit and shall be wired to ground-fault

interrupt protect the downstream outlets on that circuit unless specifically indicated to the contrary. Provide a "G.F.C.I. protected" label on each downstream outlet.

D. GFCI devices shall be installed in a “readily accessible” location per NEC requirements. GFCI protected outlets required by plans or code shall be fed by a GFCI breaker or upstream GFCI device if they are not readily accessible.

E. Where surge suppression outlets are provided, they shall be ANSI Category "A" style. They shall be installed as dedicated-circuit outlets or where indicated with multiple outlets on a circuit, they shall be placed at the homerun point of that circuit and feed-thru wired to protect the downstream outlets on that circuit.

F. All receptacles shall be installed with ground prong at **top** position unless specifically noted on plans or required by the equipment it serves. Receptacles intended to supply appliances and/or similar equipment shall be oriented as necessary to provide the best cord management and strain relief. The contractor shall rotate appliance outlets as requested by the Owner after equipment installation.

G. All outlets not provided with wiring devices shall be closed with a blank plate matching other plates in the area.

8. FIELD QUALITY CONTROL

A. Perform the following tests and inspections:
   (1) Line Voltage: Acceptable range is 105 to 132 V.
   (2) The continuity of the grounding circuit.
   (3) Correct polarity of the hot and neutral connections.
   (4) GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.

B. For receptacles in patient care areas of medical facilities perform the following tests in addition to the ones above. Submit written documentation of all test results in a format suitable for the Owners records.
   (1) Ground Impedance: Values of up to 2 ohms are acceptable.
   (2) Test straight-blade for the retention force of the grounding blade. Retention force shall be not less than 4 oz. (115 g).
   (3) For receptacles within wet location areas: Circuit leakage current and ground impedance in accordance with NFPA 99.
   (4) All other tests as required by NFPA 99

C. Wiring device will be considered defective if it does not pass tests and inspections.

D. Submit test and inspection reports.

END OF SECTION 26 27 26

SECTION 26 51 13 - LED LIGHTING

1. TRADE CONTRACT REQUIREMENTS

   A. Work of this Section is part of the Electrical Trade Contract. Refer to Section 26 00 02 "Electrical Trade Contract Requirements" for additional information about this Trade Contract.

2. RELATED DOCUMENTS

   A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.

   B. Refer to MEP Commissioning Requirements Specification 01 91 13 for electrical systems to be commissioned as part of this project. The electrical contractor shall refer to the commissioning specification and include all costs associated with the commissioning effort in their bids.

3. GENERAL

   A. Furnish and install all lighting fixtures, as herein specified, complete with accessories for safe and effective operation. All fixtures shall be installed and left in an operable condition with no broken, damaged or soiled parts.

   B. All items furnished shall comply with the latest standards applicable such as U.L., NEMA, etc., and shall bear labels accordingly. All fixtures shall be the color specified or as selected by the Architect. Wherever fixtures have evident damage, they shall be restored to new condition or shall be replaced. Likewise, fixtures showing dirt, dust or fingerprints shall be restored to new condition or shall be replaced.

   C. A PDF copy of light fixture factory shop drawings and cuts, showing fixture dimensions, photometric data, installation data and, if applicable, air handling data, shall be submitted to the Engineer for written approval 30 days after bid date. (Submission shall be made via the online project management system.)

   D. Locate pendant, surface mounted or chain-hung industrial fixtures in mechanical rooms and similar spaces to avoid ductwork and piping. Locate around and between equipment to maximize the available light. Request a layout from the Engineer if uncertain about an installation.

   E. Alternate fixtures may be substituted for types specified by name or catalog number. Proposed substitutions must be submitted to the Engineer ten working days prior to bid date for written approval to bid. This written approval will only be issued in addendum form.

F. Where emergency battery packs are provided with fixtures (if any), they shall be connected to an unswitched power line and wired in accord with the manufacturer's recommendations. Test buttons and indicator lamps shall be visible and accessible with fixture door open, or shall be remotely flush mounted in the ceiling adjacent to the fixture.

G. Where remote emergency lighting transfer relays are provided, they shall be flush mounted in the ceiling adjacent to a controlled fixture. They shall be connected to an unswitched power line and installed in accord with the manufacturer's recommendations. Test buttons and indicator lamps shall be visible and accessible without removing ceiling tiles or access panels.

H. Refer to architectural details as applicable for recessed soffit fixtures or wherever fixture installations depend upon work of other trades. Coordinate all installations with other trades. Verify dimensions of spaces for fixtures, and if necessary, adjust lengths to assure proper fit and illumination of diffuser and/or area below.

I. Warranty shall start at Final Project Completion.

4. VOLTAGE

A. All lighting fixtures will be rated 120 or 277 volts. Refer to plans for requirements.

5. LED FIXTURES

LED SOURCES

A. LED’s shall be manufactured by a manufacturer who has produced commercial LEDs for a minimum of five (5) years.
B. Lumen Output – minimum initial delivered lumen output of the luminaire shall be as follows for the lumens exiting the luminaire in the 0-360 degree zone - as measured by IESNA Standard LM-79-08 in an accredited lab. Exact tested lumen output shall be clearly noted on the shop drawings.
C. Lumen output shall not decrease by more than 20% over the minimum operational life of 50,000 hours at the rated ambient operating temperature.
D. Individual LEDs shall be connected such that a catastrophic loss or the failure of one LED will not result in the loss of the entire luminaire.
E. LED Boards shall be suitable for field maintenance and have with plug-in connectors. LED boards shall be upgradable
F. Light Color/Quality:
    a) Correlated Color temperature (CCT) range as per specification, between 3000K, 3500K and 4000K shall be correlated to chromaticity as defined by the absolute (X,Y) coordinates on the 2-D CIE chromaticity chart.
    b) Color shift over 6,000 hours shall be <0.007 change in u’ v’ as demonstrated in IES LM80 report.
    c) The color rendition index (CRI) shall be 80 or greater
    d) LED boards to be tested for color consistency and shall be within a space of 2.5 MacAdam ellipses on the CIE chromaticity chart.

LED DRIVERS

A. Driver: Acceptable manufacturer: eldoLED, Sylvania, or Philips that meet or exceed the criteria herein.
B. Ten-year expected life while operating at maximum case temperature and 90 percent non-condensing relative humidity.
C. Driver should be UL Recognized under the component program and shall be modular for simple field replacement.
D. Electrical characteristics: 120 volt, UL Listed, CSA Certified, Sound Rated A+. Driver shall be > 80% efficient at full load across all input voltages. Input wires shall be 18AWG solid copper minimum.
E. Dimming: Driver shall be suitable for full-range dimming. The luminaire shall be capable of continuous dimming without perceivable flicker over a range of 100 percent to 0.1 percent of rated lumen output with a smooth shut off function unless specifically scheduled otherwise.
F. Dimming shall be controlled by a 0-10V signal unless specifically scheduled.
G. Driver shall include ability to provide no light output when the control signal drops below 0.5 V, and shall consume 0.5 watts or less in this standby.
H. Driver shall be capable of configuring a linear or logarithmic dimming curve.
I. Drivers shall track evenly across multiple fixtures at all light levels, and shall have an input signal to output light level that allows smooth adjustment over the entire dimming range regardless of the controller type
J. Flicker: Driver and luminaire electronics shall deliver illumination that is free from objectionable flicker as measured by flicker index (ANSI/IES RP-16-10). At all points within the dimming range from 100-0.1 percent luminaire shall have: Less than 1 percent flicker index at frequencies below 120 Hz and less than 12 percent flicker index at 120 Hz, and shall not increase at greater than 0.1 percent per Hz to a maximum of 80 percent flicker index at 800Hz
K. Driver disconnect shall be provided where required to comply with codes.

LED ELECTRICAL

A. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent at any standard input voltage and meet ANSI C82.11 maximum allowable THD requirements.
B. Surge Suppression: The luminaire shall include surge protection to withstand high repetition noise and other interference. Withstand up to a 1,000 volt surge without impairment of performance as defined by ANSI C62.41 Category A. To reduce false circuit breaker tripping due to turn on inrush, the following statement ensures that electronic dimming driver will meet NEMA inrush recommendations.
C. Rush Current: Meet or exceed NEMA 410 driver inrush standard of 430 Amps per 10 Amps load with a maximum of 370 Amps2 – seconds.
D. RF Interference: The luminaire and associated on-board circuitry must meet Class A emission limits referred in Federal Communications Commission (FCC)

Title 47, Subpart B, Section 15 Non-Consumer requirements for EMI/RFI emissions

E. Driver must support automatic adaptation, allowing for future luminaire upgrades and enhancements and deliver improved performance.
F. Power Factor: The luminaire shall have a power factor of 90% or greater at all standard operating voltages and full luminaire output.

6. LIGHT FIXTURE GENERAL REQUIREMENTS

A. LED Recessed Lighting Fixtures - General Requirements

(1) The following are minimum requirements for recessed LED fixtures for lay-in grid, gypsum board, plaster and concealed spline ceilings. Surface-mounted LED fixture requirements shall be similar.

(2) Housings shall be a minimum of 4" depth, premium grade, constructed of a minimum 22 gauge die embossed or stiffened cold rolled pre-treated rust-resistant steel.

(3) All parts shall be finished with polyester powder or white baked enamel (85% minimum reflectance) painted after fabrication. All wiring shall be type TFN, or THWN and shall be covered by the steel driver cover or wiring channel. Exposed wiring is not acceptable. Connection wiring shall be accessible thru a hinged access plate above driver channel in top of unit.

(4) The complete light fixture unit shall be UL listed and labeled. Other agency listings may be acceptable with written approval from the Engineer.

(5) Fixture lens doors shall be reversible, hinged, painted after fabrication, with spring-loaded or other mechanically stable positive action latches.

(6) Lens shall be as specified for each fixture type. If a specific manufacturer and series number of lens is listed, the substitute shall be of the exact specification (thickness, prism configurations, transparency, efficiency, photometric distribution, hardness, vandal-resistance, etc.). Minimum average thickness of any prismatic lens shall be .125".

(7) Fixture trim and/or flanges shall conform with ceiling constructions as required. Verify all types prior to submission of shop drawings and indicate any special types on submittals. Fixtures installed in drywall or plaster ceilings to be provided with flange, screed and swing gate anchoring system.

(8) All fixtures shall be furnished with hold down clips to meet applicable seismic codes, four clips per fixture minimum or the equivalent thereof in the installation trim. Verify thickness of drywall or plaster ceilings prior to submission of shop drawings, to allow for proper trim adjustment.

(9) Support fixtures with one hanger wire at each end. Hanger wires shall be installed within 15° of plumb, maximum or additional support shall be provided. Wires shall be attached to the fixture body and to the building structure - not to the supports of other work or equipment.

(10) Each type of lay-in fixture shall be furnished with the proper housing flange or lip to suit the type of lay-in grid(s) being utilized on the project. The Contractor is to verify if narrow or standard grid members are being furnished and provide the proper type of light fixture trim. Indicate any special trims on shop drawing submittals.

B. Industrial and Striplight LED Fixtures - General Requirements

(1) Units shall have die-formed heavy gauge cold rolled steel channels and die-embossed reflectors.

(2) Finishes to be coated with a gloss powder paint or baked enamel finish with a minimum 85% reflectance.

(3) Units to have aligner clips where required for a continuous row appearance. Where continuous rows exceed twelve feet in length, provide a "unistrut" channel or similarly adequate mounting to stiffen and align row.

(4) Units to have captive latches for all covers and wire guards where specified. Wire guards shall be heavy-duty #14 wire gauge minimum with corrosion-resistant plated or vinyl finish.

(5) Units to be UL listed.

(6) Mounting brackets and hanging mechanisms shall be as specified in fixture descriptions, or as required. Allow a generous safety margin with all support systems, as recommended by the manufacturer.

C. Recessed Downlight - General Requirements

(1) Fixture to have an extruded or die-cast aluminum housing. Retaining mechanism shall provide easy access to LED array and driver box.

(2) Unit to have a corrosion-resistant steel junction box with hinged access covers and thermal protector.

(3) Mounting/plaster frame to be heavy gauge steel with finishing trim friction support springs, for the required ceiling thickness. Trim to be of color as selected by the Architect.

(4) Optical system to consist of a sealed LED module with diffuser.

(5) Provide telescoping channel bar hangers that adjust vertically and horizontally.

(6) Fixtures to be UL listed for thru-branch circuit wiring, recessed, and damp locations. Where installed in plaster or drywall or other inaccessible ceiling type, they shall be U.L. listed for bottom access.

D. Exit Lights - General Requirements

(1) Housings and canopies shall be die-cast aluminum or corrosion resistant steel. Edge-lit clear acrylic panel shall be provided where scheduled. Mountings shall be wall or ceiling, universal type, to suit the installation conditions.

(2) Provide with stencil face, lettering color red, of sizes in accord with code, or as otherwise specified.

(3) Provide single or double face as scheduled, indicated on plans or as required by the local authority having jurisdiction. Single face exit lights shall not be readable from the reverse side; acrylic blade style lights shall be furnished with an opaque barrier to block the reverse text image. Adjust installation position if required for clear visibility, in accord with applicable codes.

(4) Complete unit to be finished in color as selected by the Architect. Provide directional arrows as indicated on plans, as scheduled to suit the means of egress or as required by the local authority having jurisdiction.

(5) All exit signs shall be long life LED type.

(6) Where emergency backup battery packs are provided with exit lights, they shall have capacities for continuous operation per applicable codes. They shall have reserve battery capacity to operate remote lamps where indicated.

7. LIGHTING FIXTURE SCHEDULE

A. Refer to the contract drawings for Lighting Fixture Schedule

8. CONTROLS

A. Refer to Specification 262726-Wiring Devices and Specification 265116- Networked Lighting Systems for switching and controls.

9. PHOTOCELLS

A. Provide 120, 277 or 480 volt (rated as needed), 1000 or 2000 watt photocells as needed for control of certain circuits or fixtures as indicated on plans. They shall be as manufactured by Tork, Paragon, AMF or approved equivalent.

B. Mount photocells in locations concealed from sight lines standing on ground unless otherwise noted, in which case the final position shall be as directed by the Architect. Group together (if indicated at one location) and mount on back of parapet wall or otherwise properly support with mounting bracket. Coordinate with roofing installer to ensure that roof penetrations are properly made without violating or reducing the roof warranty in any way. Photocells may be mounted in other locations if it is not practical to install them on roofs or parapets, in which case the Contractor shall request direction for their mounting locations from the Engineer or Architect. Photocells shall always be mounted in a weatherproof, inconspicuous manner.

10. TIMECLOCKS

A. Provide astronomical timeclock. The number of poles, their ampacity and voltage withstand shall be to suit the load, but in no case less than 30 amps, 277 volts.

B. Timeclock coil and motor power shall be 120 volts AC. Provide a 120 volt control circuit from the nearest available panelboard.

C. Program timeclock to operate in proper time zone. Provide instruction to the Owner's representative in proper setting and operation of each type of timeclock provided.

D. Enclosures for timeclocks shall be surface type, NEMA 1 or NEMA 3R as needed. Where exposed in finished areas, provide flush-style NEMA 1 enclosures.

END OF SECTION 26 51 13

SECTION 26 56 68 – EXTERIOR ATHLETIC LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.
B. The purpose of these specifications is to define the lighting system performance and design standards for Pottsgrove High School Stadium using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.
C. The sports lighting will be for the following venues:

1. Football
2. Track

D. The primary goals of this sports lighting project are:

1. Guaranteed Light Levels: Selection of appropriate light levels impacts the safety of players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to players, spectators, and neighbors.
3. Cost of Ownership: To reduce the operating budget, the preferred lighting system shall be energy-efficient and cost-effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
4. All lighting designs shall comply with PIAA published lighting standards and local municipality ordinance requirements.
5. Control and Monitoring – To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.

    a. Control and monitoring system shall provide contactor control of all existing circuits. Key switches shall be provided to provide field-level control of existing circuit groups.
    b. Entertainment Features: Incorporation of theatrical light shows enhance the presentation and enjoyment of players and spectators. Control system shall incorporate pre-programmed light shows such as "chase", “wave”, “marquee”, and “random.” Control system shall incorporate the ability to initiate these shows locally. System shall be able to synchronize light shows to customer-supplied music.

c. Accent Lighting: To allow for custom lighting effects, including team colors, lighting for special occasions, and theatrical effects, all poles should be equipped with RGB accent luminaires to illuminate the structures in various custom colors. Colors should be selectable via an onsite device.

E. Attachments to this section include
   a. Musco Lighting System Shop Drawings
   b. Musco Stadium Field Lighting Pole & Foundation Shop Drawing
   c. Musco PRELIMINARY Control Plans
   d. Musco Preliminary Foundation and Pole Assembly Drawing

1.02 ONFIELD LIGHTING PERFORMANCE

A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting manufacturers will provide a guarantee that light levels will be sustained over the life of the warranty period. Lighting calculations shall be developed, and field measurements taken on the grid spacing with the minimum number of grid points specified below.

Manufacturers will provide lumen maintenance data of the LED luminaires used per TM-21-11 and will Incorporate the lumen maintenance projections into the lighting designs to ensure target light levels are achieved throughout the guaranteed period of the system. Per IES guidelines, lumen maintenance hours should be reported based on the 6x multiplier of testing hours.

Area of Lighting	**Average Target Illumination Levels**	**Maximum to Minimum Uniformity Ratio**	**Grid Points**	**Grid Spacing**
Football	50fc	2:1	72	30’ x 30’
Track	24.1fc	15.4:1	46	30’ x 30’

B. Color Temperature: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.

C. Playability: Lighting design and luminaire selection should be optimized for playability by reducing glare onfield and providing sufficient uplight.

1. Aiming Angles: To reduce glare, luminaire aiming should ensure the top of the luminaire field angle (based on sample photometric reports) is a minimum of 10 degrees below horizontal.
2. Glare Control Technology: Luminaires selected should have glare control technology including, but not limited to: external visors, internal shields and louvres.
   a. For offsite glare a maximum candela shall not exceed 7,500 cd measured 150 ft from perimeter of field 5 ft above grade.
3. Beam Restriction: No symmetrical beam patterns are acceptable. To minimize

player glare, NEMA beam types 1–3 shall not be used on the field of play.

4. Aerial lighting – Adequate illumination must be provided above the field to see the ball in flight. It is recommended that a lighting analysis be performed above the field of play to evaluate the visibility of the ball over its typical trajectory to ensure the participants will adequately see the ball. Calculation planes should be evaluated up to the maximum anticipated height for the level of play.

5. Mounting Heights: To ensure proper aiming angles, minimum mountings heights shall be as described below. Higher mounting heights may be necessary for luminaires with lesser glare control to meet field angle requirements of section 1.2.C.1.

# of Poles	Pole Designation	Pole Height
4	F1 – F4	70’

1.03 ENVIRONMENTAL LIGHT CONTROL

A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers, and external shields. No symmetrical beam patterns are accepted.
B. Lighting Ordinance: All lighting designs shall comply with PIAA published lighting standards and local municipality ordinance requirements.
C. Spill Light and Glare Control: To minimize impact on adjacent properties, spill light and candela values must not exceed the following levels taken at 3 ft above grade.

	Average	Maximum
150’ From Edge of Field - Specified Spill Line Horizontal Footcandles	0.014 fc	0.06 fc
150’ From Edge of Field - Specified Spill Line Max Candela (taken at 5 ft above grade)	1934.212 cd	5328.08 cd

D. Environmental glare impact scans must be submitted showing the maximum candela from the field edge on a map of the surrounding area until 7500 candela or less is achieved.
E. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be provided in 30-foot intervals along the boundary line at 3 ft above grade.
F. Sample Photometry: The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified testing laboratory with a minimum of five years experience or by a manufacturer’s laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.
G. Field Verification: Lighting manufacturer shall supply field verification of environmental light control using a meter calibrated within the last 12 months:

1. Spill verification: Illumination levels shall be taken in accordance with IESNA RP-6-22. The light sensing surface of the light meter should be held 36 inches above the playing surface with the sensing surface horizontal (for horizontal readings) or vertically pointed at the brightest light bank (for max vertical readings)

1.04 Cost of Ownership

A. Manufacturer shall submit a 25-year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.

PART 2 - PRODUCT

2.01 SPORTS LIGHTING SYSTEM CONSTRUCTION

A. Manufacturers:

1. Basis of Design– Musco's Light-Structure System™ with TLC for LED® is the approved product.

2. Or Approved Equal.

B. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.

C. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

D. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and cross-arm assembly.
2. Non-approved pole technology:
    a. Square static cast concrete poles will not be accepted.
    b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.

3. Lighting systems shall use concrete foundations. See Section 2.4 for details.
    a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm

undisturbed soil.

b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-enforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.Manufacturer will supply all drivers and supporting electrical equipment.

c. Remote drivers and supporting electrical equipment shall be mounted approximately 10 ft above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure. Integral drivers are not allowed.

b. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.

4. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
5. All luminaires, visors, and cross-arm assemblies shall withstand 150 mi/h winds and maintain luminaire aiming alignment.
6. Control cabinet to provide remote on-off control, monitoring, and entertainment features of the lighting system. See Section 2.3 for further details.
7. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.

a. Integrated grounding via concrete encased electrode grounding system.
b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780. The grounding electrode shall be minimum size of 5/8 inch diameter and 8 ft long, with a minimum of 10 ft embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 ft mounting height or less, and 2/0 AWG for poles with more than 75 ft mounting height.

D. Safety: All system components shall be UL listed for the appropriate application.

2.02 ELECTRICAL

A. Electric Power Requirements for Sports Lighting Equipment:

1. Electric power: 480 Volt, 3 Phase
2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

B. Energy Consumption: The kW consumption for the field lighting system shall be 56.56.
C. Circuits: Homerun all circuits to poles. If electrical plans require daisy-chained circuits, make connections on the dual-conductor rated disconnects in Musco electrical components enclosures or within precast base above ground level. Do not create

underground wiring connections.

D. In ground pull box requirements: Only 12 in deep (minimum) concrete polymer underground handholes and lids are allowed. Place on top of 12 in compacted ¾ in aggregate rock. Lids must be marked with "ELECTRIC." Steel lids are not allowed. Do not create underground wiring connections in pull box.

2.03 CONTROL

A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.
B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual Off/On/Auto selector switches shall be provided.
C. Contactor control of lights: To minimize wear on drivers and other electrical components and prevent lights from turning on due to communication loss, circuits must be controlled via contactor switching, not dimming driver output to zero.
D. Dimming: System shall provide for 3-stage 4-stage dimming (high-medium-low-blackout). Dimming will be set via scheduling options (Website, app, phone, email) or via an onsite user interface tablet or device.
E. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

    1. The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute “early off” commands by phone. Scheduling tool shall be capable of setting curfew limits.
    2. Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

F. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).
G. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show status of luminaire outages, control operation and service. Mobile app will be provided suitable for IOS and Android devices.

    1. Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.
        a. Cumulative hours: shall be tracked to show the total hours used by the facility.
        b. Report hours saved by using early off and push buttons by users.

H. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.

I. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.

J. Entertainment Features: Control System shall store four (4) standard preprogrammed lighting effects per field with option for two (2) custom preprogrammed lighting scenes or effects. Programming will additionally include four (4) minutes of custom programming with lights synchronized to music supplied by customer. Shows shall be initiated by a manufacturer-provided touchscreen user interface on the control system network.

2.04 STRUCTURAL PARAMETERS

A. Wind Loads: Wind loads shall be based on the 2021 International Building Code. Wind loads to be calculated using ASCE 7-16, an ultimate design wind speed of 115 mi/h and exposure category C.
B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).
C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. David Blackmore & Associates, Inc., Project 5813G1R1, May 14, 2026.
D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

PART 3 - EXECUTION

3.01 SOIL QUALITY CONTROL

A. It shall be the Contractor’s responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner’s approval / payment for additional costs associated with:

1. Providing engineered foundation embedment design by a registered engineer in the State of Pennsylvania for soils other than specified soil conditions;
2. Additional materials required to achieve alternate foundation;
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.02 DELIVERY TIMING

A. Delivery Timing Equipment On-Site: The equipment must be on-site 8 – 10 weeks from receipt of approved submittals and receipt of complete order information.

3.03 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA RP-6-22.

B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 years. These levels will be specifically stated as “guaranteed” on the illumination summary provided by the manufacturer.
2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.
3. The contractor/manufacturer will be held responsible for all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, uplight for aerial visibility, and offsite candela readings are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.04 WARRANTY AND GUARANTEE

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather condition events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.

END OF SECTION 26 56 68

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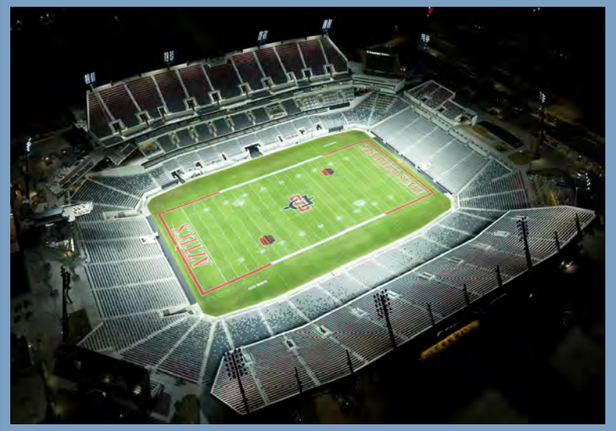
Elk River High School Stadium, Elk River, Minnesota, USA



Waukee Northwest High School, Waukee, Iowa, USA



San Diego State University, Snapdragon Stadium, San Diego, California, USA



AT&T Stadium, Dallas Cowboys, Arlington, Texas, USA

Pottsgrove High School Stadium

Pottstown,PA

Sales Representative: Andrew O'Connell · Designed By: Vashon Alexander · Design No.: 255547A_R1 · July 29, 2026

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Pottsgrove High School Stadium

Pottstown,PA

LIGHTING SYSTEM

Structure/Fixture Summary

Structure ID	Structure Height	Fixt. Attachment Ht.	Fixture Qty	Fixture Type	Load	Circuit
F1-F4	70'	70'	8	TLC-LED-1500	11.28 kW	A
		60'	2	TLC-RGBW	1.28 kW	B
		25'	1	TLC-RGB-U	0.43 kW	B
		25'	2	TLC-BT-575	1.15 kW	A
4			**52**		**56.56 kW**	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Football	49.72 kW	40
B	Pole Accent/RGBW	6.84 kW	12

Fixture Type Summary

Type	Circuit	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	A	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	8
TLC-LED-1500	A	LED 5700K - 75 CRI	1410W	181,000	>120,000	>120,000	>120,000	32
TLC-RGB-U	B	RED-GREEN (Shown)-BLUE	430W	16,000	21,300	>36,300	>36,300	4
TLC-RGBW	B	LED 5700K - 75 CRI	640W	28,500	>120,000	>120,000	>120,000	8

Single Fixture Amperage Draw Chart

Driver Specifications (.90 min power factor)	Line Amperage Per Fixture (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1500	8.4	7.9	7.3	6.3	5.0	4.6	3.6
TLC-BT-575	3.3	3.2	2.9	2.5	2.0	1.8	1.5
TLC-RGB-U	3.0	2.9	2.6	2.3	1.8	1.6	1.3
TLC-RGBW	4.5	4.3	3.8	3.3	2.7	2.5	1.9

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination Ave					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
150' Spill @ 3ft	Horizontal Illuminance	0.014	0.00	0.06	88.431	19.424	A,B	52
150' Spill @ 5ft	Max Candela Metric	1934.212	131.81	5328.08	40.422	14.674	A,B	52
Blanket Grid	Horizontal	10.2	0	75	-	-	A,B	52
Football	Horizontal Illuminance	50.9	40	64	1.62	1.28	A	40
Home Bleacher	Horizontal Illuminance	7.4	2	14	8.41	4.33	B	12
Track	Horizontal Illuminance	24.1	3	54	15.40	6.92	A	40
Visitor Bleacher	Horizontal	5.4	2	9	4.63	2.92	B	12

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

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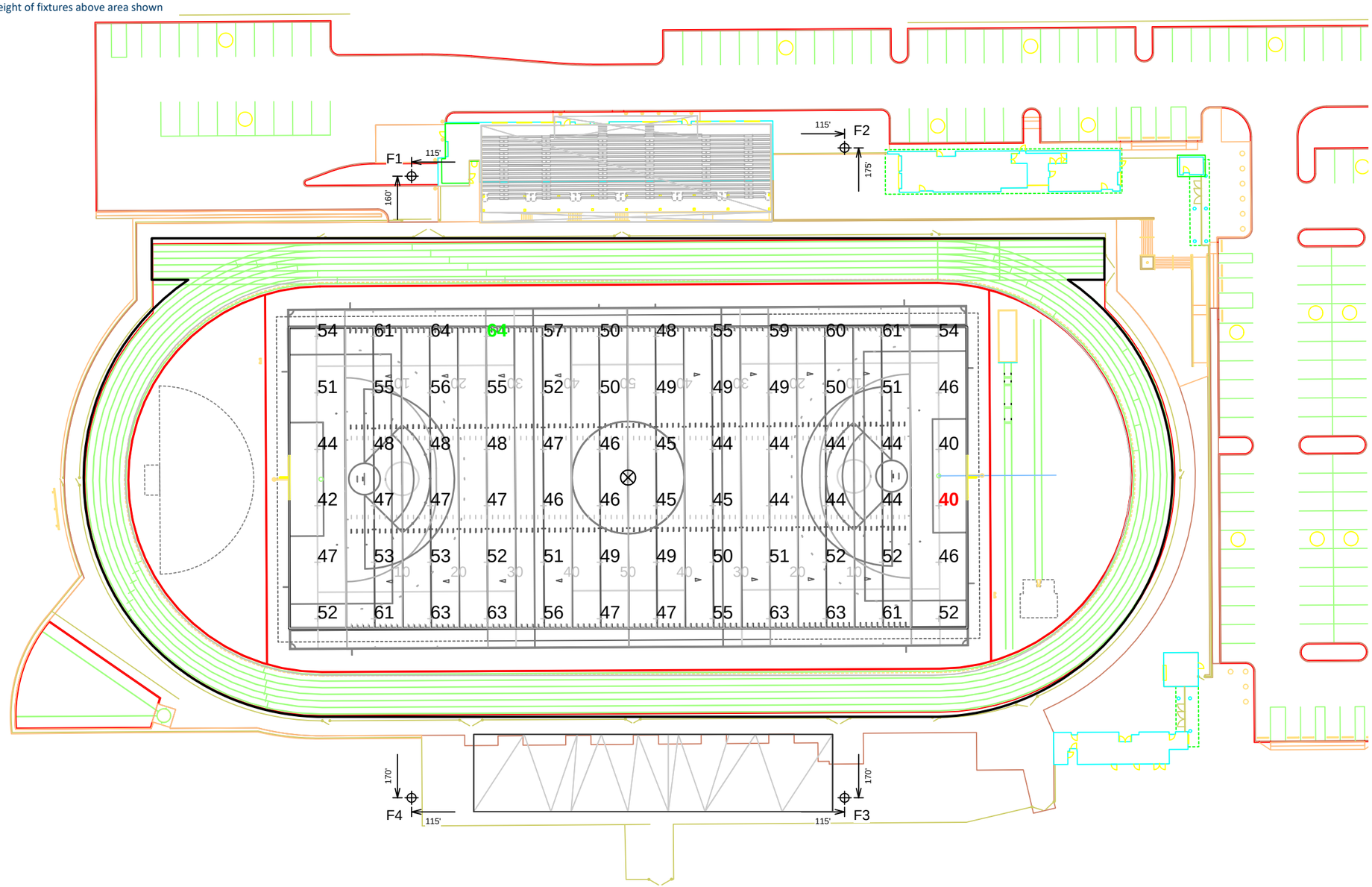
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	8	0
				60'	TLC-RGBW	2	0	2
				25'	TLC-BT-575	2	2	0
				25'	TLC-RGB-U	1	0	1
4	Totals					52	40	12

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**Football**
Size:	360' x 160'
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES	Entire Grid
Guaranteed Average:	**50**
Scan Average:	50.9
Maximum:	64
Minimum:	40
Avg/Min:	1.28
Guaranteed Max/Min:	**2**
Max/Min:	1.62
UG (adjacent pts):	1.22
CU:	0.53
No. of Points:	72
FIXTURE INFORMATION	
Applied Circuits:	A
No. of Fixtures:	**40**
Total Load:	49.72 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

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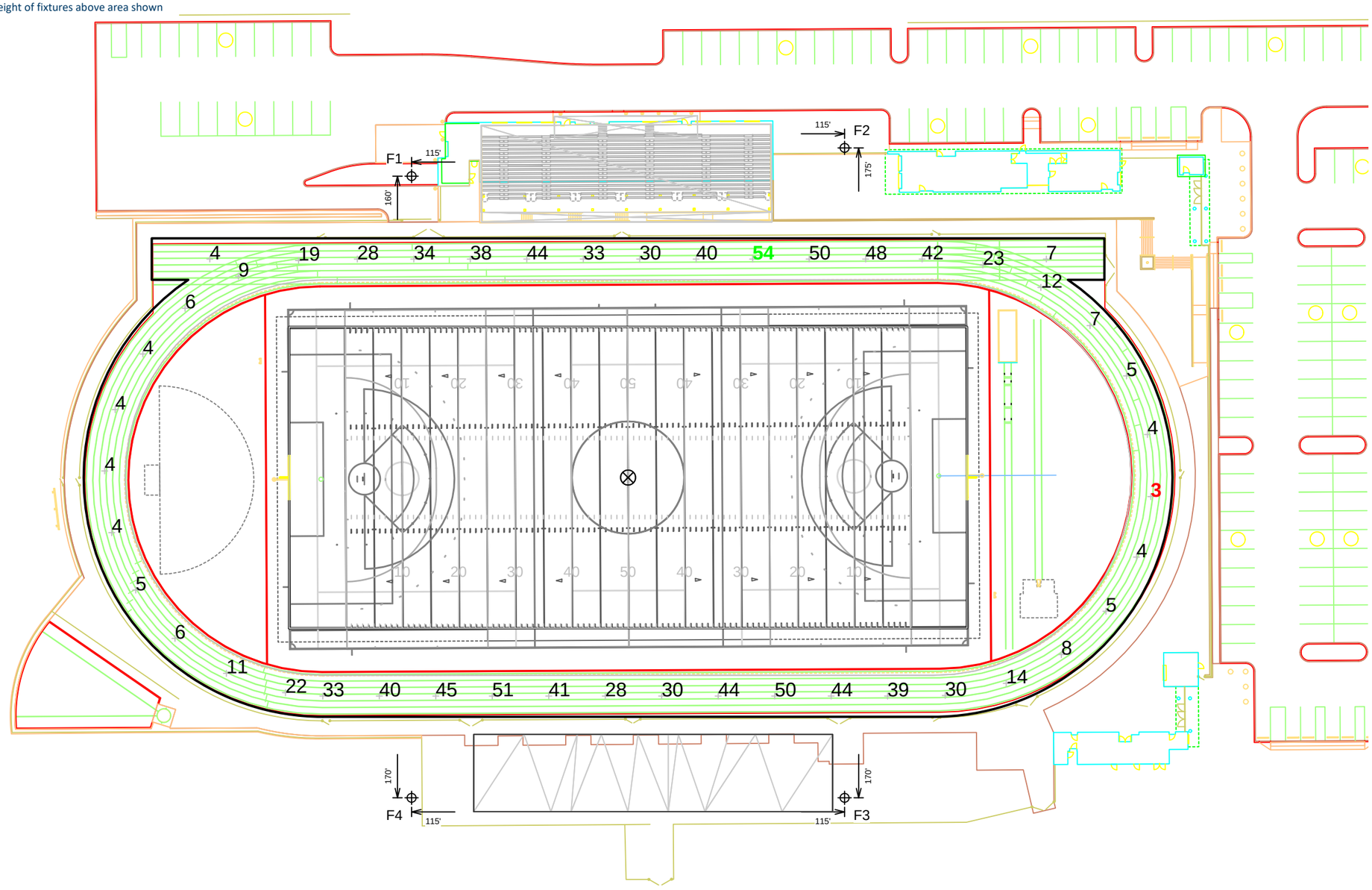
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	8	0
				60'	TLC-RGBW	2	0	2
				25'	TLC-BT-575	2	2	0
				25'	TLC-RGB-U	1	0	1
4	Totals					52	40	12

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**Track**
Size:	Irregular
Spacing:	30.0' x 30.0'
Height:	3.0' above grade

Illumination Summary

	MAINTAINED HORIZONTAL FOOTCANDLES
	Entire Grid
Scan Average:	**24.1**
Maximum:	54
Minimum:	3
Avg/Min:	6.92
Max/Min:	**15.40**
UG (adjacent pts):	0.00
CU:	0.16
No. of Points:	46
FIXTURE INFORMATION	
Applied Circuits:	A
No. of Fixtures:	**40**
Total Load:	49.72 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

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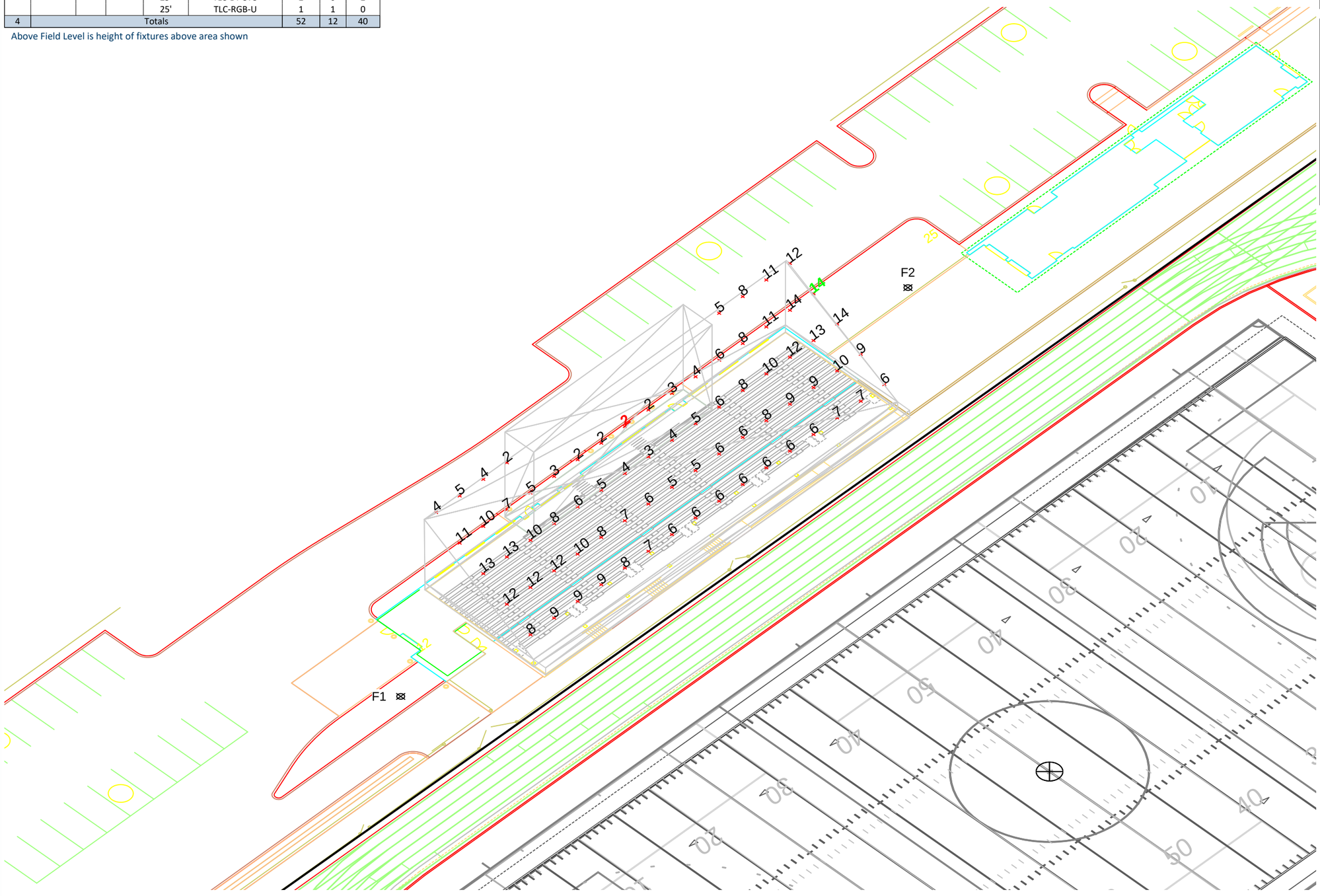
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	0	8
				60'	TLC-RGBW	2	2	0
				25'	TLC-BT-575	2	0	2
				25'	TLC-RGB-U	1	1	0
4	Totals					52	12	40

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**Home Bleacher**
Spacing:	10.0' x 10.0'
Height:	8.5' above grade

Illumination Summary

	MAINTAINED HORIZONTAL FOOTCANDLES
	Entire Grid
Scan Average:	**7.4**
Maximum:	14
Minimum:	2
Avg/Min:	4.33
Max/Min:	**8.41**
UG (adjacent pts):	0.00
CU:	0.19
No. of Points:	72
FIXTURE INFORMATION	
Applied Circuits:	B
No. of Fixtures:	**12**
Total Load:	6.84 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 30

0' 30' 60'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

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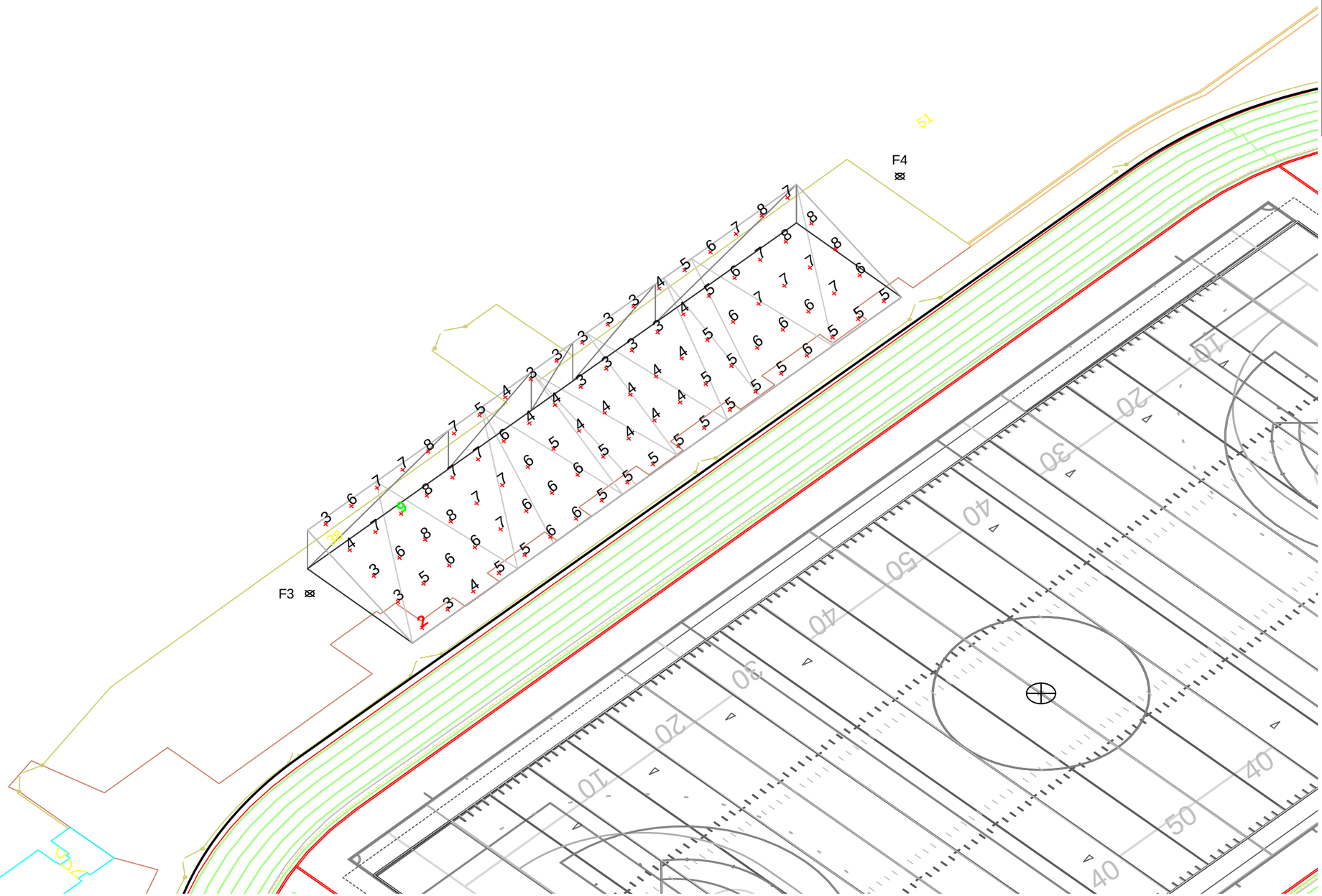
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	0	8
				60'	TLC-RGBW	2	2	0
				25'	TLC-BT-575	2	0	2
				25'	TLC-RGB-U	1	1	0
4	Totals					52	12	40

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**Visitor Bleacher**
Spacing:	10.0' x 10.0'

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES	
	Entire Grid
Scan Average:	**5.4**
Maximum:	9
Minimum:	2
Avg/Min:	2.92
Max/Min:	**4.63**
UG (adjacent pts):	1.95
CU:	0.16
No. of Points:	95
FIXTURE INFORMATION	
Applied Circuits:	B
No. of Fixtures:	**12**
Total Load:	6.84 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 30

0' 30' 60'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

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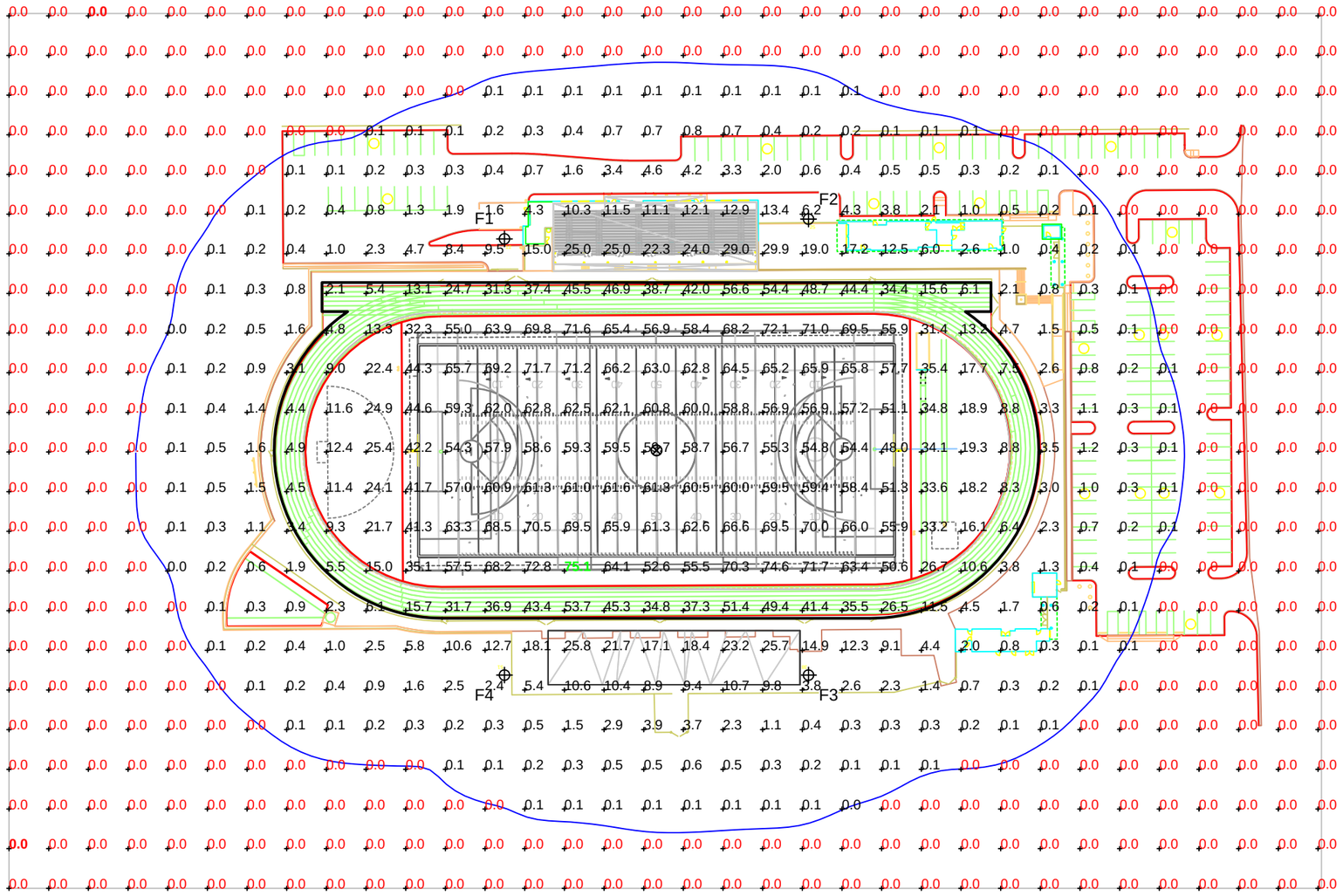
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	8	0
				60'	TLC-RGBW	2	2	0
				25'	TLC-BT-575	2	2	0
				25'	TLC-RGB-U	1	1	0
4	Totals					52	52	0

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**Blanket Grid**
Spacing:	30.0' x 30.0'
Height:	-0.0' above grade

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES	Entire Grid
Scan Average:	**10.2**
Maximum:	75
Minimum:	0
Avg/Min:	-
Max/Min:	**-**
UG (adjacent pts):	34.12
CU:	0.92
No. of Points:	782
FIXTURE INFORMATION	
Applied Circuits:	A,B
No. of Fixtures:	**52**
Total Load:	56.56 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

NOTES: Contour lines are shown at 0.0 fc.

SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

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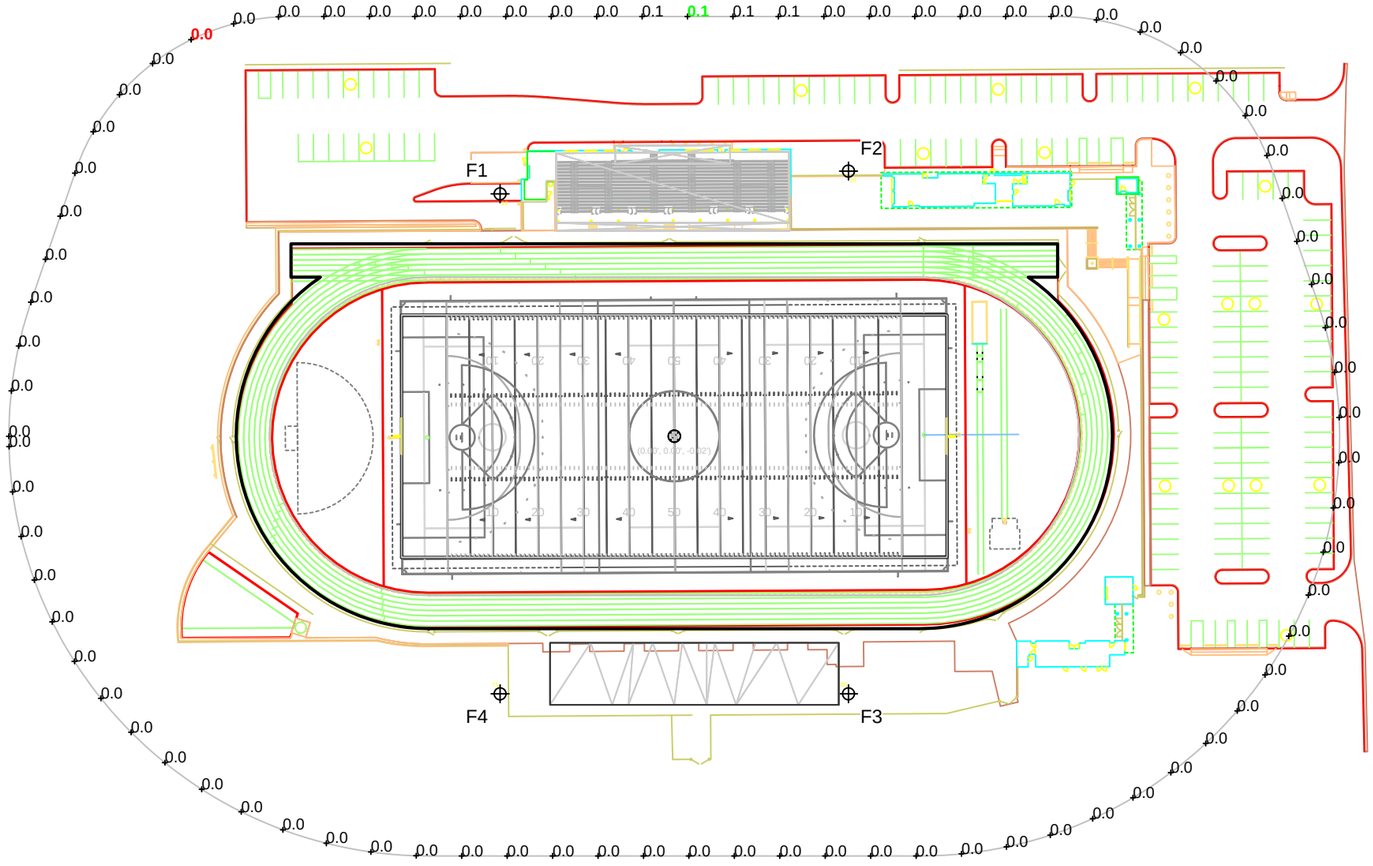
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	8	0
				60'	TLC-RGBW	2	2	0
				25'	TLC-BT-575	2	2	0
				25'	TLC-RGB-U	1	1	0
4	Totals					52	52	0

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**150' Spill @ 3ft**
Spacing:	30.0'
Height:	3.0' above grade

Illumination Summary

	INITIAL HORIZONTAL FOOTCANDLES
	Entire Grid
Scan Average:	**0.014**
Maximum:	0.06
Minimum:	0.00
CU:	0.00
No. of Points:	82
FIXTURE INFORMATION	
Applied Circuits:	A,B
No. of Fixtures:	**52**
Total Load:	56.56 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

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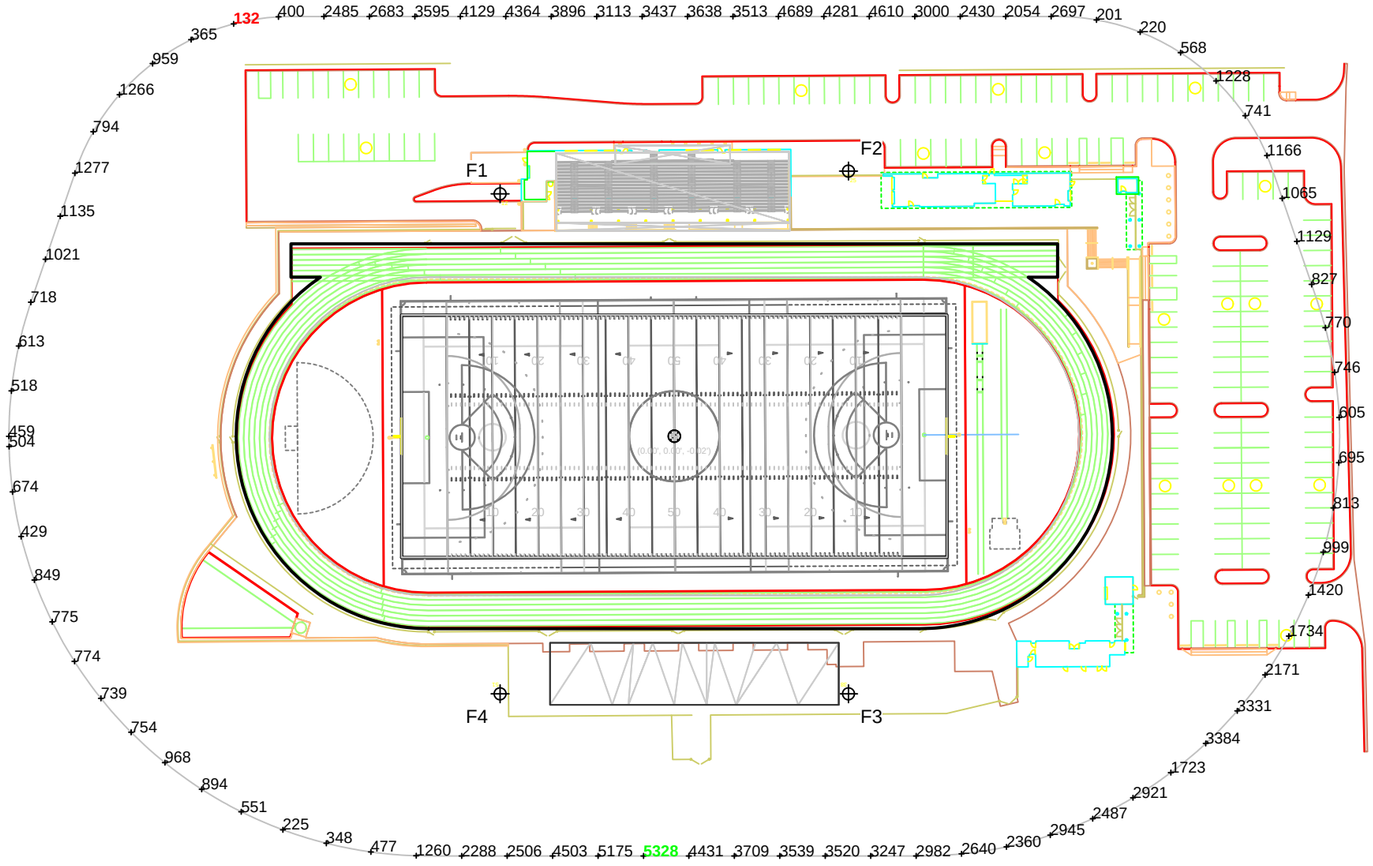
Equipment List For Areas Shown

Structure				Fixtures				
QTY	STRUCTURE ID	SIZE	GRADE ELEVATION	ABOVE FIELD LEVEL	FIXTURE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	70'	TLC-LED-1500	8	8	0
				60'	TLC-RGBW	2	2	0
				25'	TLC-BT-575	2	2	0
				25'	TLC-RGB-U	1	1	0
4	Totals					52	52	0

Above Field Level is height of fixtures above area shown



Pottsgrove High School Stadium

Pottstown,PA

Grid Summary

Name:	**150' Spill @ 5ft**
Spacing:	30.0'
Height:	5.0' above grade

Illumination Summary

	INITIAL CANDELA (PER FIXTURE)
	Entire Grid
Scan Average:	**1934.212**
Maximum:	5328.08
Minimum:	131.81
CU:	0.00
No. of Points:	82
FIXTURE INFORMATION	
Applied Circuits:	A,B
No. of Fixtures:	**52**
Total Load:	56.56 kW

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 100

0' 100' 200'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

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Pottsgrove High School Stadium

Pottstown,PA

Equipment Layout

INCLUDES:
· Football
· Track

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

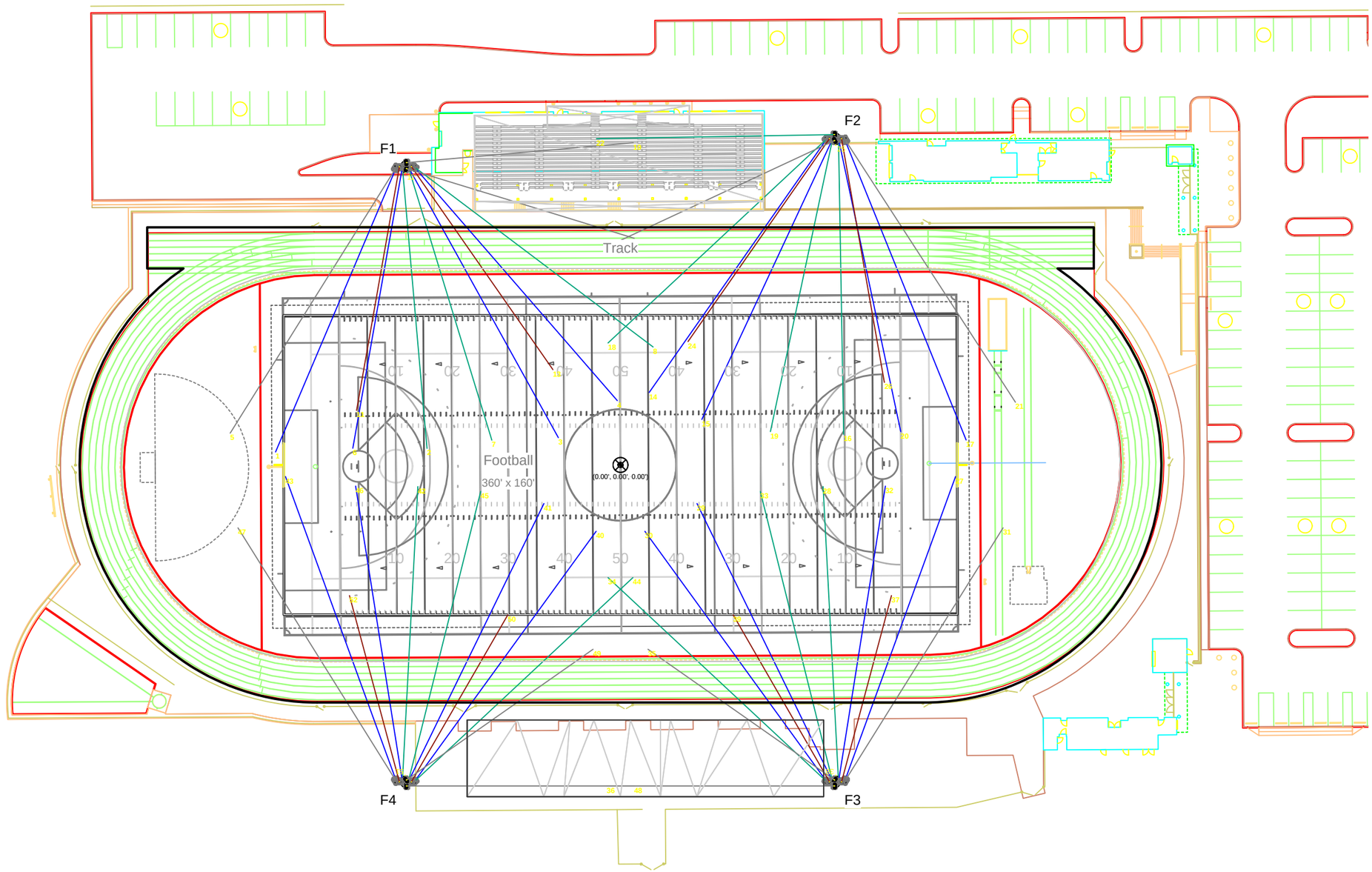
Equipment List For Areas Shown

Structure				Fixtures		
QTY	STRUCTURE ID	SIZE	GLOBAL ELEVATION	ABOVE GLOBAL LEVEL	FIXTURE TYPE	QTY/POLE
4	F1-F4	70'	-	70'	TLC-LED-1500	8
				60'	TLC-RGBW	2
				25'	TLC-BT-575	2
				25'	TLC-RGB-U	1
4	Totals					52

Above Global Level is height of fixtures above design (0,0,0)

Single Fixture Amperage Draw Chart

Driver Specifications (.90 min power factor)	Line Amperage Per Fixture (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1500	8.4	7.9	7.3	6.3	5.0	4.6	3.6
TLC-BT-575	3.3	3.2	2.9	2.5	2.0	1.8	1.5
TLC-RGB-U	3.0	2.9	2.6	2.3	1.8	1.6	1.3
TLC-RGBW	4.5	4.3	3.8	3.3	2.7	2.5	1.9



SCALE IN FEET 1 : 60

0' 60' 120'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊠

ENGINEERED DESIGN By: Vashon Alexander • File #255547A_R1 • 29-Jul-26

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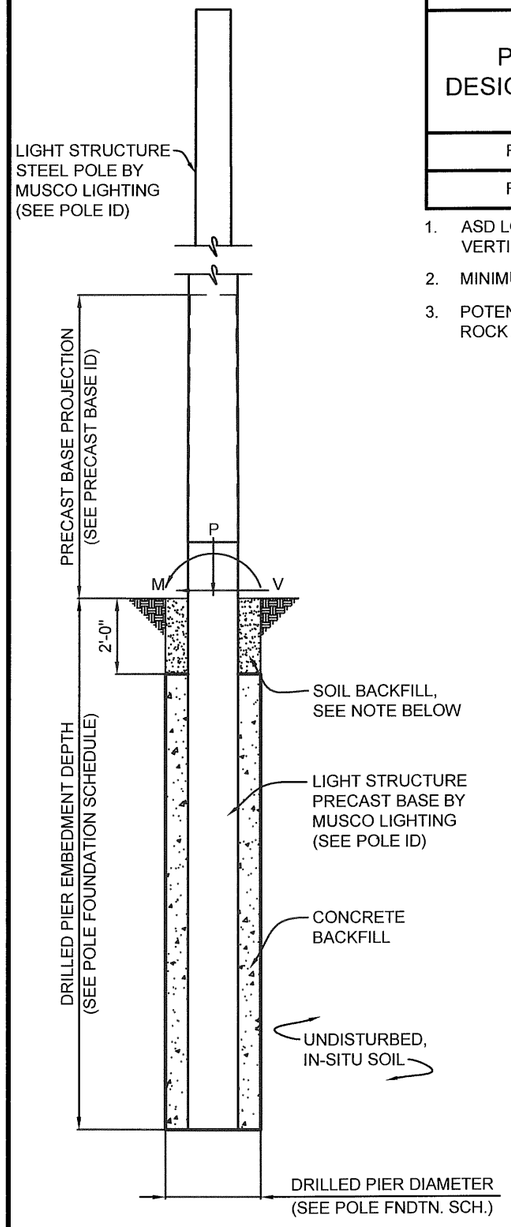


POLE FOUNDATION ELEV.

SCALE: NOT TO SCALE

SOIL BACKFILL NOTE:
THE TOP TWO FEET OF ANNULUS SHALL BE BACKFILLED WITH SOIL, WITH A CLASSIFICATION OF CLASS 5 (TABLE 1806.2) OR BETTER.

POLE FOUNDATION SCHEDULE

POLE DESIGNATION	FORCES (1.)			DRILLED PIER		
	MOMENT (M) FT-LBS	SHEAR (V) LBS	VERTICAL (P) LBS	DIAMETER INCHES	EMBEDMENT DEPTH (3.)	CONCRETE BACKFILL YD^3 (2.)
F1, F2	117,705	2,445	3,736	30	16'-0"	1.7
F3, F4	105,140	2,144	3,561	30	16'-0"	1.7

1. ASD LOAD COMBINATION D + 0.6W.
   VERTICAL FORCE IS WEIGHT OF DRESSED POLE (DOES NOT INCLUDE PRECAST BASE WEIGHT).
2. MINIMUM CONCRETE BACKFILL VOLUME, SITE CONDITIONS MAY REQUIRE ADDITIONAL BACKFILL.
3. POTENTIAL FOR ENCOUNTERING ROCK BEFORE REACHING EMBEDMENT DEPTH.
   ROCK AUGERING EQUIPMENT MAY BE REQUIRED.

PRECAST BASE IDENTIFICATION

PRECAST BASE TYPE	PRECAST BASE WEIGHT	PRECAST BASE LENGTH	PROJECTION ABOVE GRADE	STANDARD EMBEDMENT	OUTSIDE DIAMETER
5B	4,580 LBS	23'-11"	7'-11"	16'-0"	18.25"

POLE IDENTIFICATION

POLE DESIGNATION	POLE TYPE	PRECAST BASE TYPE	FIXTURE CONFIGURATION (FIX. PER XARM)	FIXTURE AND ACCESSORIES EPA (FT^2)
F1, F2	LSS70D	5B	13 (4+4+0+0+0)	46.4
F3, F4	LSS70D	5B	13 (4+4+0+0+0)	32.7

- EACH POLE HAS (2) MUSCO LED FIXTURES AT 60'-0" AGL INCLUDED ABOVE.
- POLES F1 & F2 HAVE (2) COMMUNITY R2 SPEAKERS AT 40'-0" AGL INCLUDED IN EPA ABOVE.
- POLES F3 & F4 HAVE (1) CAMERA AT 40'-0" AGL INCLUDED IN EPA ABOVE.
- EACH POLE HAS (3) MUSCO LED FIXTURES AT 25'-0" AGL INCLUDED ABOVE.

DESIGN NOTES

DESIGN PARAMETERS:
WIND: V = 115 MPH, V_{asd} = 89 MPH (EXPOSURE C, RISK CATEGORY II) PER INTERNATIONAL BUILDING CODE, 2021 EDITION (ASCE 7-16).

GEOTECHNICAL PARAMETERS:
ALLOWABLE END BEARING SOIL PRESSURE: 4.0 KSF
ALLOWABLE LATERAL SOIL BEARING PRESSURE:
NEGLECT (TO -2'-0"); 100 PSF/FT (STRATUM IF);
200 PSF/FT (STRATUM II); 300 PSF/FT (STRATUM III)
IN ACCORDANCE WITH THE 2021 EDITION OF THE INTERNATIONAL BUILDING CODE, CHAPTER 18.

REFERENCE GEOTECHNICAL EXPLORATION REPORT, PROJECT NO. 5813G1R1, PREPARED BY DAVID BLACKMORE & ASSOCIATES, INC.; POTTSTOWN, PA.

A GEOTECHNICAL ENGINEER OR REPRESENTATIVE OF IS RECOMMENDED (NOT REQUIRED) TO BE AVAILABLE AT THE TIME OF THE FOUNDATION INSTALLATION TO VERIFY THE SOIL DESIGN PARAMETERS AND TO PROVIDE ASSISTANCE IF ANY PROBLEMS ARISE IN FOUNDATION INSTALLATION.

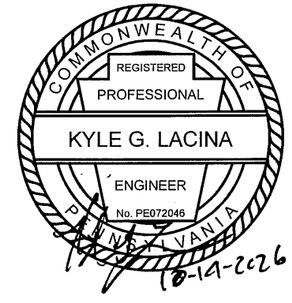
ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY OCCUR. POLE FOUNDATIONS WILL NEED TO BE ANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST. IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES. FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY. REVISIONS WILL BE ANALYZED PER RECOMMENDATIONS DIRECTED BY A REGISTERED ENGINEER.

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND CONCRETE BACKFILL PLACEMENT. CONTRACTOR SHOULD BE PREPARED FOR THE POSSIBILITY OF GROUND WATER PUMPING AND EXCAVATION STABILIZATION AS CONDITIONS MAY REQUIRE. CASINGS OR DRILLERS SLURRY MAY BE USED TO STABILIZE THE EXCAVATION DURING INSTALLATION. TEMPORARY CASINGS MUST BE REMOVED DURING CONCRETE BACKFILL PLACEMENT. PERMANENT CASINGS MUST BE SMOOTH-SIDED STEEL PIPE, AND MUST BE INSERTED INTO PLACE FIRST PRIOR TO CLEANING OUT THE INSIDE SO THAT CONTINUOUS CONTACT WITH THE SURROUNDING UNDISTURBED SOILS IS MAINTAINED.

CONCRETE BACKFILL MUST BE PLACED WITH A TREMIE WHEN SLURRY OR WATER IS PRESENT WITHIN THE EXCAVATION. THE MOUTH OF THE TREMIE MUST REMAIN BURIED IN FRESH CONCRETE SO THAT THE CONCRETE DISPLACES WATER OR SLURRY WITHOUT MIXING.

CONCRETE:
CONCRETE SHALL BE AIR-ENTRAINED AND HAVE A MINIMUM COMPRESSIVE DESIGN STRENGTH AT 28 DAYS OF 3,000 PSI. POLE ERECTION MAY TAKE PLACE AFTER STRENGTH GAIN HAS REACHED 1,000 PSI MINIMUM, OR 24 HOURS HAVE ELAPSED FROM PLACEMENT. ALL PIERS AND CONCRETE BACKFILL MUST BEAR ON AND AGAINST FIRM UNDISTURBED SOIL, OR PERMANENT CASINGS WHERE UTLIZED.

GENERAL NOTES:
FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION. ENGINEER MUST BE NOTIFIED IF FOUNDATIONS ARE NEAR ANY RETAINING WALLS OR WITHIN / NEAR ANY SLOPES STEEPER THAN 3H : 1V. POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS AND INSTALLATION PER MUSCO LIGHTING.



POTTSGROVE HS
STADIUM
FIELD LIGHTING
POTTSTOWN, PA

MUSCO Lighting
CORPORATE: 100 1ST AVE WEST
OSKALOOSA, IA 52577
(800) 825-6020

STRUCTURAL ENGINEERS, P.C.
114 NICHOLAS DRIVE
MARSHALLTOWN, IOWA 50158
PHONE NUMBER: 641-752-6334
EMAIL: MSL.INFO@SEPC.BIZ

DRAWING TITLE: POLE AND FOUNDATION
SCALE: SEE PLAN
NOTES: SCAN #255547A_R1

PROJECT NUMBER 255547
DATE 14 OCTOBER 2026
DRAWING NUMBER C1
OF ONE

USE OR REPRODUCTION OF THIS INFORMATION OTHER THAN ITS INTENDED PURPOSE FOR THIS PROJECT IS PROHIBITED WITHOUT WRITTEN CONSENT FROM MUSCO SPORTS LIGHTING, LLC.

System Requirements: Control System Summary

Project Name: Pottsgrove High School Stadium | Project #: 255547
Control System ID: 1 of 1
Distribution Panel Location/ID: Service #1

Preliminary Plans: Confirm all details - see Note 1

Project Information

Control System

Control System ID: 1 of 1
Control System Type: Control-Link ® Control and Monitoring System with Show-Light ® Entertainment
Communication Type: PowerLine-ST

Power Requirements

Control cabinet(s):
Control voltage (phase to neutral) 120/60
VA loading - Inrush 2533.0
VA loading - Sealed 296.0
Lighting Circuits:
Voltage/Hertz/Phase 480/60/3
Communication cabinet(s):
Cabinet voltage (phase to neutral) 120/60
Touchscreen(s):
Touchscreen power (receptacle) 120/60

Project Notes:

The FLA values shown are based on the following voltage/phasing:
Football: 480V/3P
Pole Accent/RGBW: 480V/1P

Equipment Listing

Description	Qty	Size (in)
Control and monitoring cabinet - primary	1	24 X 72
Communication cabinet	1	-
Touchscreen	1	-
Contactors, 30 amperes	8	-
Off/On/Auto switches	2	-

Important Notes:

1. Please confirm that the lighting circuit voltage listed above is accurate for this facility. This is the voltage/phase being connected and utilized at each lighting pole's electrical components enclosure disconnect. Inaccurate voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole location. Musco's single phase luminaires come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each circuit at each pole location. Contactors are 3 pole and 100% rated for the published continuous load.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. Size overcurrent devices using the full load amps column of the Circuit Summary by Switch chart (Minimum power factor is 0.9). Size conduit per code unless otherwise specified as larger to allow for harness connectors.
6. Avoid use of in-ground junction/pull boxes when possible. If used, the following best practices must be followed:
   • Underground handholes (pull boxes) must be supported to prevent settling. Boxes buried directly in soil, without support, are not allowed.
   • Use polymer concrete lids marked with ELECTRIC for underground handholes. Steel lids are not allowed.
   • Avoid underground connections when possible. If used, all wire connectors must be UL listed for Wet Locations to prevent leakage current.
7. Control power wiring must be in separate conduit from line or load power wiring. Communication cables must be in separate conduit from any power wiring.
8. Test wire per ANSI/NETA ATS-2021. Wires with insulation resistance less than 100 MOhms, in water-filled conduit, must be

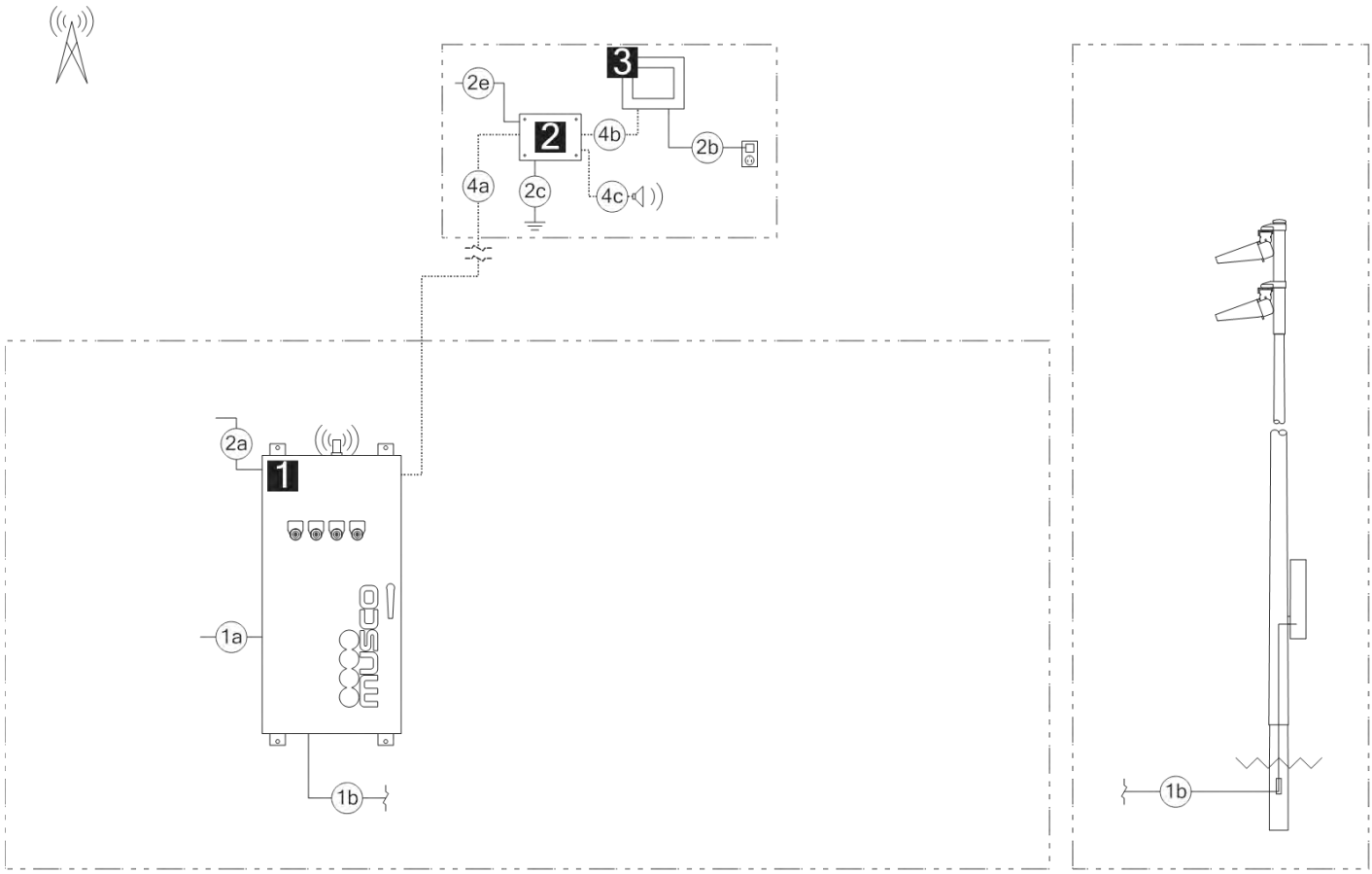
Important Notes:

8. replaced.
9. Refer to Installation Instructions for more details on equipment information and the installation requirements.

System Requirements: Control System Summary

Project Name: Pottsgrove High School Stadium | Project #: 255547
Control System ID: 1 of 1
Distribution Panel Location/ID: Service #1

Equipment Layout and Connection Details



Connection Details	
ID	**Description**
1a	Line power to contactors, and equipment grounding conductor. Requires one circuit per contactor, size wiring per load and voltage drop.
1b	Load power from contactors, and equipment grounding conductor. Requires one circuit per contactor, size wiring per load and voltage drop.
2a	Control power with equipment ground to control cabinet. Requires dedicated 20 A circuit. Provide transformer if control voltage not present.
2b	Power cord for touchscreen. Requires standard receptacle.
2c	Earth ground connection at communication cabinet location. Requires installation of ground electrode if existing earth gound not present.
2e	Control power with equipment ground.
4a	Communication cable - Communication cabinet to primary control cabinet. Requires Cat5e cable (Belden 7937A or equal), maximum of 1500 feet.

Equipment	
ID	**Description**
1	Control and monitoring cabinet - primary
2	Communication cabinet
3	Touchscreen

Sales Representative: Andrew O'Connell | Project Engineer: Vashon Alexander | Scan: 255547A | Document ID: 255547P1V1C17-0708151457

Equipment Layout and Connection Details

Connection Details - Cont'd

ID	Description
4b	Communication cable - Communication cabinet to touchscreen. 10-foot ethernet cable provided by Musco. Ethernet cable provided by contractor if longer length is needed. Maximum cable length is 300 feet.
4c	Audio cable - Communication cabinet to audio system, provided by contractor. Requires audio cable with 3.5 mm audio plug, maximum of 50 feet.

Equipment - Cont'd

ID	Description

System Requirements: Control System Summary

Circuit Summary

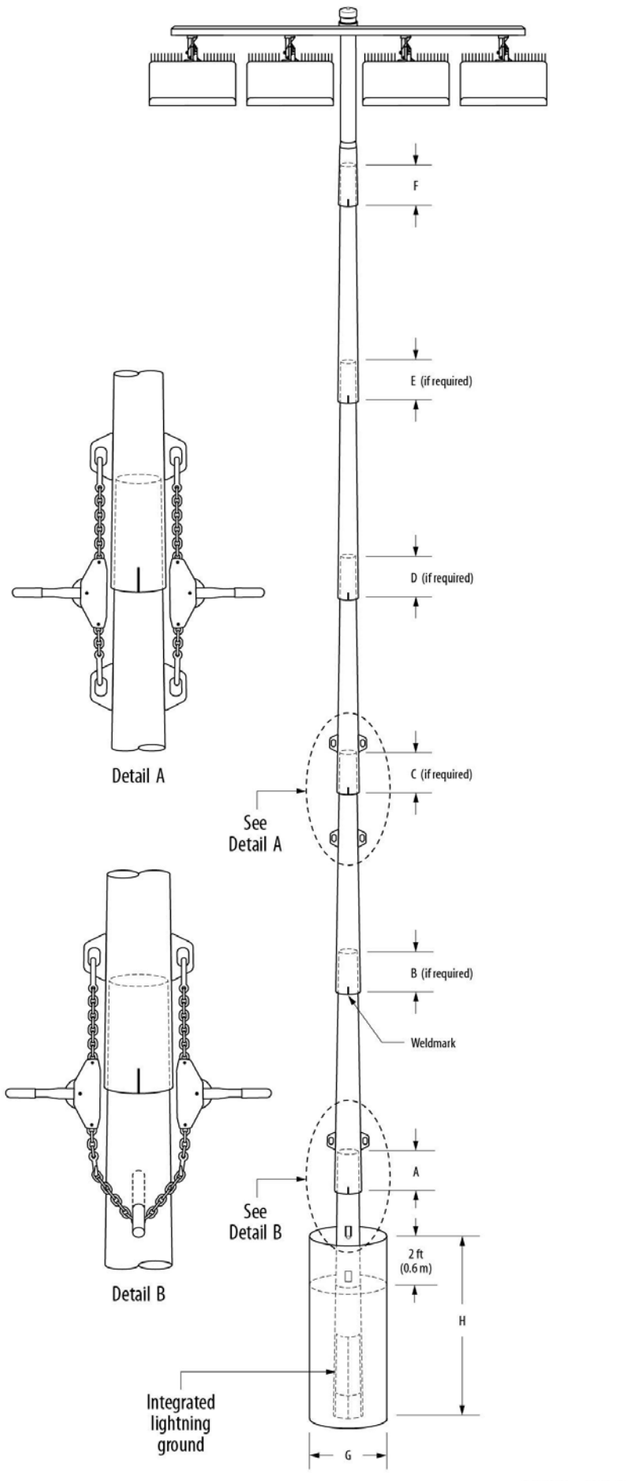
Zone Schedule		Switch Location
Field/Zone Description	Zone	
Football	1	Cabinet 1
Pole Accent/RGBW	2	Cabinet 1

Control Module ID: 1

Lighting Circuit Voltage: 480/60/3

Circuit Summary by Switch							
Switch	Zone Description	Pole ID	Qty of Fixtures	Full load amperes	Contactor Size (Amps)	Cabinet #	Contactor ID
1	Football	F1	10	20.12	30	1	C1
	Football	F2	10	20.12	30	1	C2
	Football	F3	10	20.12	30	1	C3
	Football	F4	10	20.12	30	1	C4
2	Pole Accent/RGBW	F1	3	5.16	30	1	C5
	Pole Accent/RGBW	F2	3	5.16	30	1	C6
	Pole Accent/RGBW	F3	3	5.16	30	1	C7
	Pole Accent/RGBW	F4	3	5.16	30	1	C8

PRELIMINARY FOUNDATION AND POLE ASSEMBLY DRAWING



R60-62-00-en04-01_B

TABLE 1: POLE ASSEMBLY			
POLE ID	POLE HEIGHT ft (m)	# OF LUMINAIRES	ASSEMBLED POLE WEIGHT [3] lb (kg)
F1	70 (21.3)	13	3674 (1667)
F2	70 (21.3)	13	3674 (1667)
F3	70 (21.3)	13	3674 (1667)
F4	70 (21.3)	13	3674 (1667)

Pole Assembly Notes:

1. Steel pole should overlap concrete base and be seated tight with 1 1/2 ton come-alongs (contractor provided).
2. Align weldmarks on steel sections before assembling.
3. Assembled pole weight includes steel sections, crossarms, luminaires, and electrical components enclosures. If pole has stamped structural design then use pole weight (listed as vertical force) on stamped structural design document.
4. Section overlap must be pulled together until tight. Overlap measurement should be +/- 6 in (150 mm).
5. This document is not intended for use as an assembly instruction. See *Installation Instructions: Light-Structure System™ Lighting System* for complete assembly procedure.

TABLE 2: FOUNDATION DETAILS							
POLE ID	CONCRETE BASE WEIGHT lb(kg)	BURIAL INFORMATION [3,4] G in (mm)	H ft (m)	CONCRETE BACKFILL [1,2] yd^3 (m^3)	CUT BASE	LIGHTNING GROUND [5] TYPE	SUPPLEMENTAL INSTRUCTION
F1	5300 (2404)	30 (762)	16 (4.9)	1.6 (1.2)	NO	INTEGRATED [6]	N/A
F2	5300 (2404)	30 (762)	16 (4.9)	1.6 (1.2)	NO	INTEGRATED [6]	N/A
F3	5300 (2404)	30 (762)	16 (4.9)	1.6 (1.2)	NO	INTEGRATED [6]	N/A
F4	5300 (2404)	30 (762)	16 (4.9)	1.6 (1.2)	NO	INTEGRATED [6]	N/A

Foundation Notes:

1. Concrete backfill is calculated to 2 ft (0.6m) below grade (no overage included). Top 2 ft (0.6m) to be class 5 soil compacted to 95% density of surrounding undisturbed soil unless otherwise specified in stamped structural design.
2. Concrete backfill required 3000 lb/in^2 (20 MPa) minimum.
3. Foundation design per 2021 IBC, 115 mph, exposure category C, variation STD (Risk Category II).
4. Assumes IBC class 5 soils.
5. Standard bases include integrated lightning protection. If bases are cut, supplemental lightning protection is required. Contact Musco for materials and instruction.
6. Lightning protection is a manufacturer installed concrete encased electrode and connector. Ground connection is made when concrete base is installed and footing is poured. No additional steps required.

Pottsgrove High School Stadium - Pottstown, PA, USA

Date: 10/13/2026	Scale: Not to Scale
Representative: Andrew O'Connell	Page: 1 of 1
Project: 255547	PRELIMINARY

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SECTION 27 06 10 – VOICE/DATA SYSTEM

PART 1 - GENERAL SPECIFICATIONS

1.1 RELATED DOCUMENTS

A. The Contractor is directed to examine each and every section of these specifications, all drawings relating to the Contract Documents, any and all Addenda, etc., for work described elsewhere that may relate to the provision of the work described herein. Materials and performance requirements are specified elsewhere herein that relate to these systems.

B. The use of proprietary or copyrighted names or reference to patented trade items within this specification or elsewhere in the Contract Documents is meant to establish a standard of quality and performance. In no way does such use establish a restrictive competitive bidding situation, or exclude materials or equipment that is truly equivalent to the standard of quality. All materials and equipment proposed for installation must meet or exceed all specified requirements and be approved. Known equals are listed, but will require cut sheets with performance parameters to be submitted for final approval at least 10 days prior to bid.

1.2 SUMMARY

A. Section Includes:

1. Work Area Outlets
2. 110 Copper Termination Block & Patch Panels
3. Racks, Cabinets and Cable Management
4. Horizontal Distribution Cable
5. Backbone & DAS Cabling Cable
6. Fiber Optic Termination Hardware
7. Fiber Jumpers
8. Pathways & Penetrations
9. Audio Visual Infrastructure
10. Power (PDU)
11. Grounding and Bonding
12. Copper Cable Protection Units
13. Firestopping
14. Cable System Identification System

1.3 SCOPE OF WORK

A. The intent of this specification section is to cover the materials and installation of a structured cabling system and termination equipment as outlined herein and as detailed on the drawings. Work shall consist of

1. Work area outlets including faceplates, jacks (voice, data, A/V), and labels. Boxes and conduit are being provided by Div 26 contractor.
2. Voice and data copper station cabling from work area outlets to telecommunications rooms including termination testing and labeling.
3. Voice and data work area equipment cords.
4. Voice and data horizontal cross-connect jumpers and patch cables including labeling.

B. System Description -- Voice and Data station cabling (copper) system shall consist of:
   1. Workstation outlet jacks.
   2. Voice and data station cabling as specified herein from each workstation outlet to the termination equipment located in the Main Distribution Frame (MDF) or the Intermediate Distribution Frame (IDF).
   3. Station Cable Termination Equipment in each MDF and IDF.
   4. Final connections of the station cabling at the workstation outlet jack and the termination equipment in each MDF and IDF.
   5. Cross connects / patch cable to connect work area outlets to backbone / network electronics.
   6. Testing and labeling.

1.4 REGULATORY REFERENCES:

A. All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the local Electrical Code and present manufacturing standards.

B. All materials shall be UL or ETL Listed and shall be marked as such. If UL/ETL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL/ETL has an applicable system listing and label, the entire system shall be so labeled.

C. All modular jacks, patch cords, consolidation point, and patch cords performance shall be verified (not just tested) by a third party to be category 6A component and channel compliant.

D. The cabling system described in this is derived from the recommendations made in recognized telecommunications industry standards. The following documents are incorporated by reference:

   1. ANSI/TIA-568.0-D, Generic Communications Cabling for Customer Premises, September 2015
   2. ANSI/TIA-568.1-D, Commercial Building Communications Cabling Standard Part 1: General Requirements, September 2015
   3. ANSI/TIA-568.2-D, Balanced Twisted-Pair Communications Cabling and Components Standard, September 2018
   4. ANSI/TIA-568.1-D, Optical Fiber Cabling Components Standards, October 2016

5. ANSI/TIA–569-D, Telecommunications Pathways and Spaces, November 2015
6. ANSI/TIA–606-C, Administration Standard for Communications Infrastructure of Commercial Buildings, June 2017
7. ANSI/TIA–607-C, Generic Telecommunications Bonding and Grounding (Earthing) Requirements for Customer Premises, November, 2015
8. TIA–758-B, Customer-Owned Outside Plant Communications Cabling Standard, March 2012.
9. ANSI/TIA-1179-A, Healthcare Facilities Telecommunications Infrastructure Standard,
   October, 2017
10. BICSI - TDMM, Building Industries Consulting Services International, Communications Distribution Methods Manual (TDMM) – 13th Edition.
11. National Fire Protection Agency (NFPA – 70)
12. FCC 47 CFR 68
13. NEMA 250
14. NEC 2017
15. ADA, Americans with Disabilities Act

E. If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. All documents listed are believed to be the most current releases of the documents. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.

F. This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

1.5 APPROVED VENDORS

A. The Installation Vendors (Contractors) must at a minimum possess the following qualifications:

1. Be in business a minimum of five (5) years
2. Shall demonstrate satisfaction of sound financial condition and shall be adequately bonded and insured per owner’s requirements.
3. Possess those licenses/permits required to perform communications installations in the specified jurisdiction
4. Personnel knowledgeable in local, state, province and national codes and regulations. All work shall comply with the latest revision of the codes and regulations. When conflict exists between local and national codes or regulations, the most stringent codes or regulations shall be followed.
5. Must possess and provide proof of current owners insurance certificates
6. Installers with RCDD on staff are preferred, at least one BICSI certified technician required.
7. Must have prior experience with this type of installation or work activity. The customer may, with full cooperation of the contractor, visit client installations to observe equipment operations and consult with references. Specified

visits and discussion shall be arranged through the contractors; however, the contractor's personnel shall not be present during discussions with references. The contractor must provide a minimum of three (3) references of similar jobs, one within the past 6 months and one at least 3 years ago where the same solution was installed.

8. Documentation of ALL certifications to be provided in bid package
9. Outside Plant Projects – will be done by pre approved vendor according to demographic and size of project.
10. Berk-Tek and Leviton are equivalent manufacturers.

1.6 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The Telecommunications contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not.

B. The work shall include, but not be limited to the following:

1. Furnish and install a complete telecommunications wiring infrastructure.
2. Furnish, install, and terminate all UTP and Optical Fiber cable
3. Furnish and install all wall plates, jacks, patch panels, and patch cords.
4. Furnish and install all required cabinets and/or racks as required and as indicated.
5. Furnish any other material required to form a complete system.
6. Furnish and install j-hooks where needed for the horizontal distribution
7. Furnish and install all materials to build out the MDFs/IDFs as depicted on drawings
8. Telecommunications contractor is responsible for the tray in MDFs/IDFs. The tray for the horizontal distribution may be done by or in coordination with the electrical contractor
9. Perform link testing (100% of horizontal and/or backbone links/channels) and certification of all components.
10. Furnish test results of all cabling to the owner electronically, listed by each closet, then by workstation ID.
11. Adhere and comply with all requirements of Manufacturer Certification.
12. Provide owner training and documentation. (Testing documentation and As-built drawings)

1.7 SUBMITTALS

A. Under the provisions of this request for proposal, prior to the start of work the telecommunications contractor shall:

1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this spec.

2. Submit proof from manufacturer of contractor's good standing in manufacturer's program.
3. No substitutions/alternatives from the manufacturers listed in this document will be permitted. No substituted materials shall be installed except by written approval.
4. Product Data: For each type of product indicated.
    a. Submittals shall include manufacturer's data sheets (cut sheets) and be accompanied by a detailed bill of material, including part numbers and quantities.
5. Shop Drawings:
    a. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by Owner.
    b. Wiring diagrams to show typical wiring schematics including the following:
        1) Cross-connects.
        2) Patch panels.
        3) Patch cords.
    c. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
    d. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
        1) Vertical and horizontal offsets and transitions.
        2) Clearances for access above and to side of cable trays.
        3) Vertical elevation of cable trays above the floor or bottom of ceiling structure.
        4) Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
6. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
7. Source quality-control reports.
8. Field quality-control reports.
9. Maintenance Data: For connectors to include in maintenance manuals.

B. Work shall not proceed without the Owner's approval of the submitted items.

1.8 QUALITY ASSURANCE

A. The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations necessary to complete the installation of this structured cabling system in compliance with the specifications and drawings. The contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not. All installers must be employees of the contractor.

1.9 DELIVERY, STORAGE AND HANDLING

A. Cable shall be stored according to manufacturer's recommendations as a minimum. In addition, cable must be stored in a location protected from theft, vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F. minimum) location. If necessary, cable shall be stored off site at the contractor's expense.
B. If the telecommunications contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.

1.10 DRAWINGS

A. It shall be understood that the electrical details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the telecommunications contractor in bidding the job. The telecommunications contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications.
B. The contractor shall verify all dimensions at the site and be responsible for their accuracy.
C. Prior to submitting the bid, the telecommunications contractor shall call the attention of the Engineer to any materials or apparatus the telecommunications contractor believes to be inadequate and to any necessary items of work

1.11 COORDINATION

A. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers.
   1. Meet jointly with telecommunications and LAN equipment suppliers, Engineer, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
   2. Record agreements reached in meetings and distribute them to other participants.
   3. Adjust arrangements and locations of racks, sleeves, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of utility demarcation, telephone and LAN equipment.
B. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

PART 2 - PRODUCTS

2.1 EQUIVALENT PRODUCTS

A. Due to the nature and type of communications all products and solutions in this document have a standard of quality listed. Substitutions are listed, but products MUST demonstrate performance equivalency.

2.2 WORK AREA OUTLETS

A. Work area cables shall each be terminated at their designated work area location in the connector types described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.

B. The Telecommunications Outlet Assembly shall accommodate:
   1. A minimum of two (2) modular jacks unless specified. Additional copper cables as necessary.
   2. A blank filler will be installed when extra ports are not used.
   3. The same orientation and positioning of jacks and connectors shall be utilized throughout the installation.
   4. The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA–606-C standard specifications. Hand printed labels shall not be accepted.

C. Faceplates: Standard of quality is Legrand Part # OR-403HDJ14 (4 port) or OR-403HDJ12 (2 port)
   The faceplates shall:
   1. Be of the style as appropriate to fit the modular jack used
   2. Have mounting screws located under recessed designation windows.
   3. Comply with ANSI/TIA 606-C work area labeling standard.
   4. Workstation Outlets: Connector assemblies mounted in faceplate. Provide number of ports as shown on the Drawings.
   5. Retain one of first two subparagraphs below, or retain both as required to match Division 26 Section "Wiring Devices."
   6. Plastic Faceplate: High-impact plastic.
   7. For use with snap-in jacks accommodating any combination of UTP, F/UTP, optical fiber, and coaxial work area cords.
   8. Acceptable substitutions are Systimax and Panduit

D. Voice / Data Jacks: Standard of quality is Legrand

   1. Jacks: 100-ohm, unshielded balanced, twisted-pair connector; four-pair, eight-position modular. Comply with ANSI/TIA-568.2-D up to 500 MHz.
   2. All pair combinations must be considered, with the worst-case measurement being the basis for compliance. Modular jack performance shall be third-party verified by a nationally recognized independent testing laboratory.
   3. The modular jack shall be backwards compatible to Category 3, 5e and 6.
   4. The modular jack shall be center tuned to category 6 test specifications.
   5. Cat 6A jacks to be used for Wireless Access Points for speeds in excess of 1 Gigabit transmission
   6. Acceptable substitutions are Systimax and Panduit

2.3 MODULAR PATCH PANELS

A. The Modular Patch Panels shall
   1. meet category 6 and 6A component compliance and be verified by a third-party nationally recognized independent testing laboratory
   2. be backward compatible to category 3, 5 and 5e
   3. be center tuned to category 6 and 6A test specifications
   4. An unloaded patch panel with Legrand High Density Category 6 and 6A jacks is preferred.
   5. Standard of Quality is Legrand

Part Number	Description
OR-PSAHJU48	48 Port unloaded 2RU Angled Panel (for HD Jacks)

   6. Acceptable Substitutions are Systimax and Panduit

2.4 RACKS, CABINETS, AND CABLE MANAGEMENT

The equipment rack shall provide vertical cable management and support for the patch cords at the front and back of the rack. Waterfall cable management shall be provided at the top of the rack to maintain proper bend radius and cable support. Wire management shall also be mounted above each patch panel and/or piece of equipment on the rack. The rack shall include mounting brackets for cable tray ladder rack to mount to the top of the rack.

A. Free-Standing Rack shall:
   1. provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA 568.2-D.
   2. have ANSI/TIA hole pattern on front and rear.
   3. Provide channels with 10” depth for routing of horizontal cable
   4. provide pre-drilled base for floor attachment of rack.
   5. be available in standard color of black or white.
   6. Standard of quality for 4 post racks shall be Legrand Mighty Mo 20.

Part Number	Description
OR-MM20730ADJ38-B	Black 4 Post Rack, 7’ high adjustable to 24” Depth

   7. Acceptable substitutions are Middle Atlantic and Tripp Lite

B. The vertical and horizontal cable management shall be utilized and installed with the 4 post racks.
   1. They shall include snap on covers/doors that can swing either direction.
   2. Standard of quality for cable management shall be Legrand MM20 for vertical and SHMC series for horizontal.

Part Number	Description
OR-MM20VMD706-B	Single Sided 6” Vertical Cable Management with door, 6” W x 10.25” D x 7’ H (for end of row or single racks)
OR- MM20VMD710-B	Single Sided Vertical Cable Management with door,10.5” W x 15”D x 7’ H (for between racks)
OR-SHMC2RU	2U Horizontal cable manager to be used between patch panels and/or switch gear
OR-SHMC4RU	4U Horizontal cable manager to be used to pass patch cords from one side of the rack to the other

3. Acceptable substitutions are Middle Atlantic and Tripp Lite

C. Wall Mounted Cabinet shall:
   1. provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA 568.2-D.
   2. have wall mount braces with locator posts for easy wall mounting.
   3. have side access points that allow for access to manage/install distribution cables in the vertical channels.
   4. be lockable.
   5. contain integrated vertical cable management
   6. The standard of quality for wall mount cabinet shall be Legrand:

Part Number	Description
SWM12RUPL-26-26	26”W x 25”H x 28”D, plexi-glass door 12 RU; 200 lbs*

*weight capacity

7. Acceptable substitutions are Middle Atlantic and Tripp Lite

D. Free-Standing Fully Cabinet cabinet, where shown on drawings, shall have full flat mesh front door with locking swing handles
   1. Standard of quality is Legrand

Part Number	Description
OR-QC422442	Legrand Server Cabinet, free-standing, 42U, 24” W, 42”D, with side panels (cabinet accessories to be specified)
OR-QC422942	Legrand Network Cabinet, free-standing, 42 RU, 29.5” W, 42” D with side panels (cabinet accessories to be specified).

2. Acceptable substitutions are Middle Atlantic and Tripp Lite

E. UPS (Uninterrupted Power Supply)

1. Provide true online battery back-up, power conditioning UPS, rack mounted in each TR to serve network electronics as indicated on the drawings. UPS shall have the following features:
   a. VA capacity as indicated.

b. Output operating range—120V (<3000VA) nominal
c. Communications—Unit shall provide an Ethernet based SNMP management interface, through the LAN to provide remote diagnostics and alarm conditions.
d. Expandability—Unit shall provide for the connection if external battery packs in modules to extend the total unit run-time.
e. Complete battery independence- Battery independent restart ensures automatic UPS power-up without user interaction after lengthy power outages, even when batteries are completely drained\discharged.
f. Cord Length - 10'.
g. Transfer Time- zero transfer time to battery.
h. Battery Type- maintenance free sealed lead acid with electrolyte: leakproof.
i. LED Status- On battery/Replace Battery/and overload indicators.
j. Audible Alarms.
k. Filtering -full time multi- pole noise filtering
l. All UPS units shall be rack mountable with proper mounting hardware and support.

2. UPS Sizes – PROVIDE ONE UPS UNIT PER RACK SPECIFICED IN ALL MDF/IDF ROOMS

a. 2200 VA UPS (Tripp Lite part number SU2200RTXLCD2U). Used in podiums, credenzas, conference rooms, classrooms and IDFs
1) Output Power Capacity - 1800 wattts/2200VA.
2) Nominal Output Voltage- 120V.
3) Output Connections- (6) NEMA 5-15\20R and (1) NEMA L5-20R.
4) Nominal Input Voltage- 120V.
5) Input connections - NEMA 5-20P.
6) Rack Mounted - 2U rack space.
7) Backup time- 12 minutes at half load (925 watts) 4 minutes at full load (1800 watts.)
8) Surge energy Rating – 570 joules.

F.

2.5 HORIZONTAL DISTRIBUTION CABLE

A. All horizontal data station cable and voice cable shall terminate on modular patch panels (copper), or patch/splice cabinets (fiber) in their respective MDF or IDF as specified on the drawings.

B. Copper or fiber cable that offers EPDs (Environmental Product Declaration) and / or HPDs (Health Product Declaration) to apply toward LEED certification are PREFERRED.

C. 100 OHM Category 6 UTP with fire-resistant thermoplastic jacket with separator or divider between pairs and isolation wrap.

1. Physical Characteristics:

a. Non Plenum
   1) Insulation: Polyolefin
   2) Jacket: FR PVC
   3) Nominal Velocity of Propagation: 70
b. Solid annealed copper conductors
c. 23 AWG copper conductors
d. Low-dielectric thermoplastic insulation
e. Pair-separator for improved performance
f. Characteristic Impedance: 100 ± 15 Ohms
g. Comply with UL 444
h. Comply with NFPA 262
i. Comply with ICEA S-90-661 for mechanical properties.
j. Comply with ANSI/TIA-568-C.2 for Category 6A UTP cables.
k. Verified for Category 6A performance by an NRTL
l. RoHS compliant materials

2. Performance Characteristics:
   a. Guaranteed electrical performance up to 400 MHz
   b. Guaranteed 3 dB margin over ANSI/TIA-568.2-D requirements for NEXT and PSNEXT
   c. Guaranteed 4 dB margin over ANSI/TIA-568.2-D calculated requirements for ACR and PSACR
   d. Printed with unique alpha-numeric code for each package of product
   e. Printed in both feet and meters with the units of length decrementing to indicate the amount of cable remaining in the box.
   f. Tip colors shall be a lighter version of the ring color.
   g. 4 pair UTP for Wireless Access Points for speeds in excess of 1 Gigabit transmission (A/C): Cat 6A with isolation wrap (no ground required) or actual shield (needs grounding).

3. Design Make:

   a. Standard of quality is Superior Essex Cat 6(a) UTP.
   b. 6B-246-xx (where “xx” indicates color) for Cat6A
   c. 66-246-xx (where “xx” indicates color) for Cat6

2.6 BACKBONE CABLE

A. Fiber Optic Cables

1. Fiber cable that offers EPDs (Environmental Product Declaration) and / or HPDs (Health Product Declaration) to apply toward LEED certification are PREFERRED.

2. Single Mode: Armored Optical Fiber Tight Buffered With Enhanced (Low Water Peak) Single-mode Optical Fibers

   a. Each Single-mode Fiber shall be:

1) Class IVa dispersion - unshifted single mode optical fibers with Low Water Peak complying with ANSI/ TIA-492CAAB-2000.
2) The nominal mode field diameter shall be 9.1 µm with a tolerance of ± 0.4 µm at 1310 nm when measured in accordance with ANSI/TIA-455-191-B.
3) Transmission Characteristics:
4) Maximum cabled attenuation dB/km @ 1310/1550 nm: 0.7/0.7
5) The cabled cutoff wavelength shall be ≤1260 nm when measured in accordance with ANSI/TIA-455-80-C
6) Distance vs. bandwidth using a Laser transmitter operating at a 1310 nm wavelength

b. Physical Characteristics:
   1) Shall be suitable for use in indoor applications.
   2) Shall be suitable for use in risers, and horizontal applications.
   3) Shall be available with a fiber strand count range from 6 to 144.
   4) Shall comply with Telcordia GR-409.
   5) Shall comply with the requirements of ICEA S-83-596.
   6) Buffered fibers shall be color coded in accordance with TIA-598 with an overall yellow jacket.
   7) Shall have a central strength member
   8) Suitable for operation between -20°C to +75°C
   9) Shall meet UL 1569, UL 1651
   10) Shall have spiral wrapped aluminum armor and outer jacket

c. Design Make:
   1) Standard of quality for Armored Single Mode Low Water Peak is Superior Essex

   2) Acceptable Substitutions are Corning and Systimax

2.7 FIBER OPTIC TERMINATION HARDWARE

A. FIBER OPTIC ENCLOSURES
1. Fiber optic termination hardware is rack mountable and holds various coupler panels based on density requirements.
2. Fusion Splicing (splice cassettes, pigtails, or splice on connectors) shall be the preferred termination style for any new installations, unless otherwise stated.
3. Internal lighting for ease of use
4. Pivot arms for fiber slack management
5. Standard of quality is Legrand
6. Acceptable Substitutions are Systimax and Corning
7. Fiber Enclosures

Part Number	Description
OR-INFC01U-M4	1U combo splice/patch enclosure, holds 4 adapter panels,
OR-INFC02U-M4	2U combo splice/patch enclosure, holds 8 adapter panels,
OR-INFC04U-M4	4U combo splice/patch enclosure, holds 16 adapter panels,

B. SPLICE CASSETTES (used instead of fiber optic adaptor panels)

Part Number	Description
OR-M4LCD12-09S1A1	12 Fiber Singlemode Splice Cassette, LC Duplex

a. Fan Out Kits (if needed to build up 250um fiber before termination)

Part Number	Description
OR-61500858	Breakout Kit 12 fiber

C. FIBER OPTIC ADAPTER PANELS (used w/ pigtail or splice on connector terminations)

Legrand Adapter panels will be of 6 duplex LC connectors (12 fibers) for both multimode and single mode connections.

Part Number	Description
OR-HDFP-LCD12AC	6-LC Duplex Single mode, blue adapters, ceramic sleeve
OR-HDFP-BLANK	Blank Filler modules

D. FIBER OPTIC PIGTAILS / CONNECTORS

1. For fiber splicing, utilize Legrand 12 strand LC fiber pigtails or fusion splice on connectors. Legrand part numbers:
   a. Single Mode OR-P1TC4ZRSZZZ001M
   b. Single mode fusion splice on connector, OR-205KNF9SA-09

2. When mechanical terminations are acceptable for MAC work, Utilize Legrand LC single mode (OR-205KNT9SA-09) and Legrand LC multimode (OR-205KNT9GA-50T) Infinium Connectors for standard terminations.

Part Number	Description
OR-P1TC4ZRSZZZ001M	12 strand Single mode LC fusion splice pigtail
OR-205KNF9SA-09	Single mode fusion splice on connector,
OR-205KNT9SA-09	LC Single mode Infinium mechanical connectors

3. Acceptable Substitutions are Systimax and Corning

2.8 PATCH CORDS & FIBER JUMPERS

A. The contractor shall provide factory terminated and tested optical fiber patch cords for the complete cabling system.

B. Copper (UTP) patch cords shall:

1. Standard of quality is Legrand Cat 6
2. Standard lengths include: 6in, 1 ft, 3 ft, 5 ft, 7 ft, 9 ft, 10 ft, 15 ft.
3. use 8 position connector with impedance matched contacts and designed using dual reactance.
4. be constructed of 100 ohm, 4 pair, 24 AWG, stranded conductor, unshielded twisted pair copper per the requirements of the ANSI/TIA 568.2-D.
5. meet TIA category 6 component specifications in ANSI/TIA 568.2-D
6. 100% factory tested to meet category 6 performance and
7. ETL or any other nationally recognized 3rd party verification
8. be capable of universal T568A or T568B wiring schemes.
9. Modular connector shall maintain the paired construction of the cable to facilitate minimum untwisting of the wires.
10. have “snagless” protection for the locking tab to prevent snagging and to protect locking tab in tight locations and provide bend relief
11. be backwards compatible to Category 3, 5e and 6
12. be manufactured by an ISO 9001 registered company.
13. Provide one 10 foot Cat6A patch cord for every switch port.
14. Provide one 7 foot Cat6A patch cord for every workstation phone and computer
15. Provide one 3 foot Cat6A patch cord for every wireless access point.
16. The contractor shall include the labor cost in the quote to install all patch cords in the wiring closets as well as the workstation.
17. Acceptable substitutions are Quiktron, Systimax and Panduit

C. Fiber jumper cords shall:

1. Standard of quality for Multimode duplex 5 meter 50 um 10 gig aqua for multimode applications is Legrand LC to LC (OR-P1DF2LRGZGZ005M).
2. Provide four (4) duplex LC-LC 5 meter jumpers per switch in each TR.
3. Standard of quality for Single Mode duplex 5 meter for single mode applications is Legrand LC to LC (OR-P1DC2IRSZSZ005M).
4. Provide two (2) duplex LC-LC 5 meter jumpers per rack in each TR.
5. Acceptable substitutions are Quiktron, Systimax and Corning

2.9 PATHWAYS & PENETRATIONS

A. Conduit

1. All conduit work shall meet the requirements of the National Electrical Code.
2. All voice, data and video wiring inside rooms shall be protected by metallic conduit or other means such as Legrand/Wiremold or troughs in the floor. Aluminum is not acceptable in caustic environments. EMT conduit shall be used for all interior wiring. All conduits are to be concealed.
3. No more than an equivalent of two 90-degree bends are allowed in a run between junction boxes or pull boxes.
4. Entrance to junction boxes or distribution panels shall be adjacent to the corners.
5. In major renovation and new construction projects where the MDF/IDF are not in alignment, the contract shall include provisions for installation of four riser conduits (4 inches minimum diameter) from the MDF to each IDF. A pull string and appropriate junction pull box shall also be provided in each conduit run to facilitate future installation of cable(s). Maxcell fabric innerduct should be used to create multiple pathways in each 4" conduit.
6. All conduits in slab shall be a minimum of 1 inch. All exceptions shall be determined during the design stage of the project and shall be subject to the approval of the engineer.
7. All sleeves must protrude 4 inches AFF and below and be capped at both ends. Coordinate with customer for the number of conduits entering the facility. All sleeves must be bonded to the telecommunications bonding system.
8. No horizontal conduit run shall be more than 100 feet between pull boxes.
9. Pull boxes must be installed every 180 degrees or 100 feet of the conduit run. All conduit stubs must be bonded to the telecommunications grounding system.

B. Conduit/Raceway Capacity

1. Conduit shall be sized using industry standard guidelines for telecommunications distribution methods. Guidelines can be found in the Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual and/or cabling manufacturers' guidelines. Utilize Maxcell fabric innerduct to maximize conduit fills

Part Number / Series	Description
MXC4003 series	Standard 4" 3 Cell fabric innerduct
MXR4003 series	Riser 4" 3 Cell fabric innerduct
MXD4003 series	Detectable 4" 3 Cell fabric innerduct
MXC3456 series	Standard 3" 3 Cell fabric innerduct
MXR3456 series	Riser 3" 3 Cell fabric innerduct
MXD3456 series	Detectable 3" 3 Cell fabric innerduct

C. Cable Trays

1. Standard of quality for basket tray is Cablofil.

2. All cable trays shall be designed to accommodate all types of cabling. All telecommunications pathways (Caddy J-hooks, basket tray or Legrand/Wiremold raceways) shall be used for communications medium (voice, data and fiber optic cabling) only.

3. The minimum dimensions for a cable tray shall be 12 inches wide and 4 inches deep. The tray must consist of continuous, rigid, welded steel or stainless steel wire mesh cable management system. The cable tray systems are defined to include, but are not limited to, straight sections, supports and accessories. Wire mesh cable tray will have continuous Safe-T-Edge T-welded top side wire to protect cable insulation and installers. Basket tray shall be spliced using EDRNs on the sides as well as an SWK washer/nut in the bottom of the tray.

4. Contract documents shall show cross section of the communication wire way or cable tray. The drawing must show reference to other utilities in the building. All sections of the cable tray must be bonded together with approved bonding methods and devices. For installation of other types of “approved” low voltage cables in the cable tray, a separate tray or at minimum a divider in the basket tray to prevent interference from unshielded cables is required.

5. Supports for cable trays larger than 12 inches in width are to be installed according to the manufacturer specifications. A single support is not acceptable. All supports are to be fastened to the building structure above. If the cable tray will be of a wall mount type, it must be installed properly to provide proper permanent support at trays maximum capacity.

6. Radius Drop outs shall be used whenever multiple cables are exiting the tray.

7. STI’s EZ Path’s (44, 33 or 22 series) shall be used in conjunction with the tray whenever cabling is going through a fire rated wall.

8. Cable trays must maintain a minimum of 6-inch clearance from obstructions above the tray and a minimum of 8 feet AFF. Trays are to provide access via the most direct path to all communications outlets on the floor.

9. Install sweeping factory 90's for all turns. Use end-of tray terminations where wire drops down to walls to prevent abrasions and cuts from metal tray edges. Use a trapeze supported cable tray mounting method suspended by manufacturer recommended size all-thread. Fasten all-thread to ceiling anchors, allowing no bends in all-thread. Support the cable tray in this manner at every section-to-section junction and at 5 feet

to 6 feet intervals (mid span) between joints. Whenever possible, the tray should be no closer than 6 inches from the structural ceiling, ducts or pipes, considering all other possible obstructions. A minimum of 5 inches distance from lighting, especially fluorescent lighting, is desired.

10. Coordinate layout and installation of cable tray with other trades. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Architect. Basket tray installation in the TRs shall be installed as depicted on the drawings by the Telecommunications Contractor. The basket tray that is to be installed for the horizontal and backbone distribution will be provided and installed by the electrical contractor.

11. Storage and Handling: Avoid breakage, denting and scoring finishes. Damaged products will not be installed. Store cable trays and accessories in original cartons and in clean dry space; protect from weather and construction traffic. Wet materials will be unpacked and dried before storage.

12. Refer to the drawings for the size and location of the tray to be installed.

13. Ground cable trays at end of continuous run. Ground continuous cable tray runs every 60 feet. Cable trays that are not UL Classified will be grounded per NEC requirements and manufacturer recommendations.

14. Ground cable trays against fault current, noise, lightning, and electromagnetic interference by mounting grounding wire to each 10’ cable tray section with grounding clamp.

D. Open Top Cable Supports (J-hooks)

15. Standard of quality is Erico/Caddy HP series of j-hook
16. All open top cable supports (J-hooks) must be suspended from or attached to the structural ceiling or walls with hardware or other installation aids from Caddy specifically designed to support their weight. When used, Caddy J hooks shall be located on 48 to 60 inch centers to adequately support and distribute the cables weight. These types of supports may typically hold up to fifty 0.25-inch diameter cables.
17. No other cables shall be run in the same j-hooks along with the voice and data cables. A separate painted (white, red, blue, green) Caddy j-hook system must be provided to facilitate the installation of other low voltage cabling.
18. For larger quantities of cables that convene at the Telecommunications Closet, provide Cablofil cable trays or other special ERICO/CADDY supports that are specifically designed to support the required cable weight and volume.
19. No plastic j-hooks will be allowed.
20. Substituted material must demonstrate product equivalency.

E. Floor Mounted Assemblies (Floor Boxes and Poke Throughs)

1. All Floor Mounted Assemblies including floor boxes, poke through, floor outlets, floor mounted whips, tombstones, etc. shall be sized using industry standard guidelines for telecommunications distribution methods; specifically relating to cable fill ratios and limitations. Guidelines can be found in the Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual and/or through individual cabling manufacturers' installation guidelines.

2. Standard of quality for all Poke-throughs and floor boxes is the Evolution series from Legrand/Wiremold.

3. Floor boxes Shall:

    a. be used in concrete, raised floor and wood floor applications and are fully adjustable both pre and post concrete pour.
    b. have removable dividers and a tunnel feature that allows all compartments to be connected.
    c. have removable modules through the top or back of the floor box.
    d. The floor box hinge must is able to open to a full 180º and lie flat on the floor surface providing easy access to interior modules. Cable egress doors lock in position when open and will automatically close around wires to protect cabling and avoid tripping hazards.
    e. accept single, double or triple wall plates as well as accommodate power, communications and A/V devices.
    f. be designed to maintain up to a 2 hour fire rating.

4. Poke throughs Shall
    a. provide the interface between power, communication and audio/ visual (A/V) cabling in an above grade concrete floor and the workstation or activation location where power communication and/or A/V device outlets are required.
    b. provide recessed device outlets that will not obstruct the floor area. The poke-thru device shall be compatible with the complete line of workstation connectivity outlets and modular inserts.
    c. permit all wiring to be completed at floor level.

        1) The 6AT, and 6ATCFF units shall mount in a 6" (152mm) cored hole, actual 6 1/16" (154mm) core hole.
        2) The 8AT units shall mount in an 8" (203mm) cored hole, actual 8 1/16" (205mm) core hole. Use is defined by the UL Fire Resistance Directory as a minimum spacing of "2 ft. (610mm) on center and not more than one device per each 65 sq. ft. (6m2) of floor area in each span."

F. Wall Boxes (A/V, Power, Data behind flat screens)

1. Standard of quality for all wall boxes is the Proximity series from Legrand/Chief.

2. Wall Boxes Shall:
   a. be used for TVs, Monitors, & Digital Signage for use in new construction and renovation construction projects.
   b. be compatible with complete line of workstation connectivity outlets and modular inserts, and most audio/video manufacturers' products.
   c. provide the interface between power, communication and audio/video (A/V) cabling new construction and renovation location where power and communication and/or A/V device outlets are required.
   d. provide recessed device outlets that will not obstruct the wall area.
   e. permit all wiring to be completed at box level.

   a. covers.

Part Number / Series	Description
EFB Series	Evolution Floor Box
6AT Series	Evolution Poke Throughs 6"
8AT Series	Evolution Poke Throughs 8"
PAC525FC	Proximity 6 Gang Box

1. Substituted materials for floor boxes, poke throughs, wall boxes and conference room applications must be able to demonstrate product equivalency.

2.10 POWER – PDU OPTIONS

G. PDU Standard of quality is Tripp Lite part number PDUMV20NET SWITCHED/IP FEATURE SET REQUIRED. Substituted material must be able to demonstrate product equivalency.

1. Raceway and all components shall be UL listed. The base and cover shall be ivory in color, and shall be attached to the cable ladder of the rack system or wall field as per the drawings.
2. Electrical outlet strip shall have (13) NEMA 5-15\20 outlets.
3. Provide all attachment hardware required to securely attach the outlet strip to the back of the vertical cable ladder or wallfield. Refer to the detailed drawings for required locations.
4. All power strips shall be equipped with surge protection.
5. All power strips shall be come with adjustable mounting brackets for 2 or 4 post installation.
6. Strips shall be 20A-120V with NEMA 5·20P on a 15 foot line cord.
7. Install and test all outlets prior to project completion.
8. Provide outlet strip with attached cord and 3-prong plug.

2.11 FIRESTOP

A. Standard of quality is EZ Path Fire rated cable pathway devices shall be used in fire-rated construction for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:

1. Meet the hourly fire-rating of fire rated wall and or floor penetrated.
2. Be tested for the surrounding construction and cable types involved.
3. Have UL Systems permitting cable loads from; “Zero to 100% Visual Fill.” This requirement eliminates need for fill-ratio calculations to be made by cable technicians to ensure cable load is within maximum allowed by UL System.
4. Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.
5. Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
    a. Opening or closing of doors.
    b. Spinning rings to open or close fabric liner.
    c. Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
    d. Furnish letter from manufacturer certifying compliance with this definition of “Zero-Maintenance”.
6. Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
7. Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
8. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.
9. Cable pathway shall replace conduit sleeves in walls and floors, and;
10. When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
11. When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
12. When multiple units are ganged in floors, devices shall be anchored by means of a tested grid.

13. When installed individually in walls, devices shall pass through core drilled opening utilizing tested wall plates or integrated flanges.
14. When multiple units are ganged in walls, devices shall be anchored by means of a tested grid.
15. Cable tray shall terminate at each barrier (wall) and resume on the other side such that cables pass independently through devices. Cable tray shall be properly supported on each side of the barrier (wall). Cable tray shall NOT pass through the barrier (wall).
16. Substituted material must demonstrate product equivalency.

B. As an alternate to using a fire-rated or non-rated cable pathway device for single low voltage cables (up to 0.27 in. (7 mm) O.D) penetrating one or two-hour, gypsum board/stud wall assemblies or non-rated assemblies, either as a through-penetration or as a membrane-penetration, a fire-rated EZ Path individual cable grommet may be substituted. The product shall consist of a molded, two-piece, grommet having a foam fire and smoke sealing membrane that conforms to the outside diameter of the individual cable. The grommet product shall be capable of locking into place to secure the cable penetration within the wall assembly. The grommet shall be UL Classified and tested to the requirements of ASTM E814 (UL1479) and CAN/ULC S115.

17. Acceptable Products from STI:

Part Number / Series	Description
EZD22	2” EZ Path Firestop Device
EZD33FWS	3” EZ Path Firestop Device
EZDP133CWK	3” EZ Path Firestop Device Kit (for 4” conduit)
EZDP33FWS	3” EZ Path Firestop Device Kit (square mount)
EZP433W	3” Ganging Accessory (Qty 4) for 3” EZ Paths
EZD44S	6” EZ Path Firestop Device
EZDP44S	6” EZ Path Firestop Device Kit (square or round mount)
EZP544W	Ganging Accessory (Qty1-5) for 6” EZ Paths
RFG2	Individual Cable EZ firestop grommet (10 pack)

2.12 GROUNDING AND BONDING

A. The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor. The TBB shall be installed independent of the building’s electrical and building ground and shall be designed in accordance with the recommendations contained in the ANSI/TIA-607 Telecommunications Bonding and Grounding Standard.

B. The main entrance facility/equipment room in each building shall be equipped with a PBB (Primary Bonding Busbar) formerly known as the telecommunications main grounding bus bar (TMGB). Each telecommunications room shall be provided with a SBB (Secondary Bonding Busbar formerly known as the telecommunications ground bus bar (TGB). The PBB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

C. All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TR or ER shall be grounded to the respective SBB or PBB using a minimum #6 AWG stranded copper bonding conductor and compression connectors.

D. All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

E. Standard of quality for all grounding and bonding products shall be Legrand.

F. Acceptable substitutions are Erico and Panduit

PART 3 - EXECUTION

3.1 WORK AREA OUTLETS

A. Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer’s bend radius. In hollow wall installations where Caddy box-eliminators are used, excess wire can be stored in the wall. No more than 12” of UTP and 36” of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

B. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA 568-1.D document, manufacturer's recommendations and best industry practices.

C. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

D. Bend radius of the twisted-pair horizontal cable shall not be less than 4 times the outside diameter of the cable.

E. The cable jacket shall be maintained to within 25mm (one inch) of the termination point.

F. Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented faceplates shall occupy the right-most position(s).

G. Voice jacks shall occupy the top position(s) on the faceplate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).

3.2 HORIZONTAL DISTRIBUTION CABLE INSTALLATION

A. Cable shall be installed in accordance with manufacturer's recommendations and best industry practices.

B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

C. Cable raceways shall not be filled greater than the ANSI/TIA 569-D maximum fill for the raceway type or 40%.

D. Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.

E. Where transition points, or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.

F. The cable's minimum bend radius and maximum pulling tension shall not be exceeded.

G. If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 48 to 60 inch (1.2 to 1.5 meter) intervals. At no point shall cable(s) rest on acoustic ceiling grids or panels.

H. Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance.

I. Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.

J. Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling.

K. Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.

L. Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA 606-C. The cable label shall be applied to the cable behind the faceplate on a section of cable that can be accessed by removing the cover plate.

M. Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.

N. Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.

O. Any cabling that is unprotected and becomes painted or covered in fireproofing spray or other materials, shall be replaced at the cost of the offending contractor.

3.3 HORIZONTAL CROSS CONNECT INSTALLATION

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA 568-D standard, manufacturer's recommendations, and best industry practices.

B. Pair untwist at the termination shall not exceed 13 mm (0.5 inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained as close as possible to the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.4 OPTICAL FIBER TERMINATION HARDWARE

A. Fiber slack shall be neatly coiled within the fiber splice tray or enclosure. No slack loops shall be allowed external to the fiber panel.

B. Each cable shall be individually attached to the respective splice enclosure by mechanical means. The cables strength member shall be securely attached the cable strain relief bracket in the enclosure.

C. Each fiber bundle shall be stripped upon entering the splice tray and the individual fibers routed in the splice tray.

D. Each cable shall be clearly labeled at the entrance to the splice enclosure. Cables labeled within the bundle shall not be acceptable.

E. A maximum of 12 strands of fiber shall be spliced in each tray.

F. All spare strands shall be installed into spare splice trays.

3.5 BACKBONE CABLE INSTALLATION

A. Backbone cables shall be installed separately from horizontal distribution cables

B. A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.

C. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

D. Backbone cables shall be installed in metallic conduit.

E. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

F. All backbone cables shall be securely fastened to the sidewall of the TR on each floor.

G. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

H. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

I. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

3.6 COPPER TERMINATION HARDWARE

A. Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA-568-D standard, manufacturer's recommendations, and best industry practice.

B. Pair untwist at the termination shall not exceed 12 mm (one-half inch).

C. Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.

D. Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

E. The cable jacket shall be maintained to within 25 mm (one inch) of the termination point.

F. Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

3.7 RACKS

A. Racks shall be securely attached to the concrete floor using a minimum 3/8” hardware or as required by local codes.

B. Racks shall be placed with a minimum of 36 inch clearance from the walls on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall behind and in front of the row of racks and from the wall at each end of the row.

C. All racks shall be grounded to the telecommunications ground bus bar in accordance with Section 2.11 of this document.

D. Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.

E. Wall mounted termination block fields shall be mounted on 4’ x 8’ x .75” void free plywood. The plywood shall be mounted vertically 12” above the finished floor. The plywood shall be painted with two coats of white fire retardant paint.

F. Wall mounted termination block fields shall be installed with the lowest edge of the mounting frame 18” from the finished floor.

3.8 FIRESTOP SYSTEM

A. All firestop systems shall be installed in accordance with the manufacturer recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance.

3.9 GROUNDING SYSTEM

A. The TBB shall be designed and/or approved by a qualified PE, licensed in the state that the work is to be performed. The TBB shall adhere to the recommendations of the ANSI/TIA 607-C standard, and shall be installed in accordance with best industry practice.

B. Installation and termination of the main bonding conductor to the building service entrance ground shall be performed by a licensed electrical contractor.

3.10 IDENTIFICATION AND LABELING

A. The contractor shall develop and submit for approval a labeling system for the cable installation. The Owner will negotiate an appropriate labeling scheme with the successful contractor. At a minimum, the labeling system shall clearly identify all components of the system: racks, cables, panels and outlets. The labeling system shall designate the cables origin and destination and a unique identifier for the cable within the system. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the appropriate labeling scheme. Labeling shall follow the guidelines of ANSI/TIA-606-C.

B. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of ANSI/TIA-606-C. Furnish electronic record of all drawings, in software and format selected by Owner.

E. Cable and Wire Identification:

1. Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.

3. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

4. Both ends of all backbone cable shall be labeled. Labels will be self laminating and machine generated. The label shall contain the following information:
    a. The Origination (TR it is feeding from).
    b. The Destination (TR it is feeding).
    c. Number of pairs or fibers

5. Both ends of all horizontal cables shall be labeled. Labels shall be self-laminating and machine generated. The cable, workstation faceplate, panel ports and block positions shall be labeled with the room number, location in room, outlet type & # (data D1, D2, etc). In rooms with multiple outlets, label clockwise as you enter the room: 1, 2, 3 e.g. a data port at the first drop location to the left of Room 216 door would be (216-1 D1). When terminating workstation cables in the TR, organize and label the cables in numeric room number order at the patch panel.

6. CNS will approve all labeling schematics prior to installation. "As-Built" drawing with all outlets identified shall be provided.

F. Labels shall be self-laminating or computer-printed type with printing area and font color that contrasts with cable jacket color. Handwritten labels will not be acceptable.

1. Cables use flexible vinyl or polyester that flex as cables are bent.

2. All labeling methodology, identification logic, and materials will be approved by customer prior to installation.

3. If existing labeling scheme is in place, all labeling will defer to currant scheme as to stay consistent with facility.

3.11 TESTING AND ACCEPTANCE

A. General

1. All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA 568-D; marginal passes (*PASS) are not acceptable. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

2. All cables shall be tested in accordance with this document, the ANSI/TIA standards, the Legrand Certification Program Information Manual and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.

B. Copper Channel Testing

1. All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance.

2. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance.

3. The basic tests required are:

    a. Wire Map
    b. Length
    c. Attenuation
    d. NEXT (Near end crosstalk)
    e. Return Loss
    f. ELFEXT Loss
    g. Propagation Delay
    h. Delay skew
    i. PSNEXT (Power sum near-end crosstalk loss)
    j. PSELFEXT (Power sum equal level far-end crosstalk loss)

4. Continuity - Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

5. Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA 568-D Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.

6. Category 6A Performance

   Shall meet the channel requirements outlined below for a 100-meter, 4-connector channel.

Channel Margin Guarantees

Parameter	Margin vs. TIA-568.2-D
Insertion Loss	3%
NEXT	4 dB
PSNEXT	5 dB
Return Loss	4 dB
ACRF	8 dB
PSACRF	8 dB
PSANEXT	4dB
PSAACRF	10 dB
ACR	7 dB
PSACR	7 dB

C. Fiber Testing

1. Testing procedures shall be in accordance with the following:
   a. ANSI/TIA 568.3-D
   b. ANSI/TIA 568-1.D
   c. ANSI/TIA 526-7-A, Method A.1
   d. ANSI/TIA 526-14-C, Method B

e. Tier 1 fiber testing is required. Tier 2 Fiber Testing is recommended.

2. Preparation
   a. Properly clean all connectors, adapters, and jumpers prior to testing.
   b. Ensure that the testing jumpers are of the same fiber core diameter and connector type as the fibers to be tested.
   c. The power meter shall be properly calibrated prior to testing. Contractor to provide written confirmation of the calibration, with the power meter serial number, to the Owner, if requested. If this documentation is not available upon request, the Contractor shall re-test all optical fiber cables after documented calibration of the power meter is accomplished.
3. Test Equipment
   a. Optical power meter and source (Certification tester Fluke or Agilent preferred). Suitable OTDR with launch cable for Tier 2 testing. OTDR Launch Cable length recommendation is 75 meters for MMF and 300 meters for SMF systems.
4. Testing
   a. All Multimode fibers shall be tested to the requirements of ANSI/ TIA-568-3-D, TIA-526-14-C (Method B). Optical fibers shall be tested at both 850 nm and 1300 nm wavelengths for end-to-end insertion loss, and bi –directional (MTR to TR-1, TR-1 to MTR)
   b. All Single-mode fibers shall be tested to the requirements of ANSI/ TIA-568-3-D, TIA-526-7A (or Method A.1). Optical fibers shall be tested at both 1310 nm and 1550 nm wavelengths for end-to-end insertion loss, and bi-directional (MTR to TR-1, TR-1 to MTR)
   c. Ensure that the power meter and light source are set to the same wavelength prior to testing each fiber.
   d. Connect an appropriate test jumper to the light source and power meter.
   e. Power on both the power source and light meter, allowing them to stabilize.
   f. Record the reference power reading in dB. If the jumper is removed from the light source for any reason, the reference power reading must be re-established.
   g. Insert a second appropriate jumper, using an appropriate adapter, between the first jumper and the power meter. Record the power reading in dB.
   h. Provide written documentation of all test results to owner. Provide electronic copy of test results, in original tester format, to manufacturer when registering project for warranty on-line.

3.12 SYSTEM DOCUMENTATION

A. Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.

B. Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor,

etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.

C. The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

3.13 TEST RESULTS

A. Test documentation shall be provided on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.

B. The field test equipment shall meet the requirements of the most current version of ANSI/TIA 568 including applicable TSB’s and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.

C. Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The telecommunications contractor must furnish this information in electronic form (CD-ROM).

D. Test documentation shall also be provided to the manufacturer within three weeks after the completion of the project. Test results shall be uploaded when registering the project for warranty using the manufacturer’s on-line system. Test results shall be in the tester’s original format from an approved tester listed on manufacturer’s website. All test results must show a PASS; marginal passes (*PASS) are not accepted.

E. When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

3.14 AS-BUILT DRAWINGS

A. The drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. The Owner will provide floor plans in paper and electronic (DWG, AutoCAD rel. 14) formats on which as-built construction information can be added. These documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.

B. The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (AutoCAD rel. 14) form.

PART 4 - WARRANTY AND SERVICES

4.1 WARRANTY

A. A warranty shall be provided for all internal infrastructure wiring as it pertains to voice and data networking for both copper and fiber systems. All installations must be performed according to the manufacturer's System Warranty and Performance Application.

B. The warranty will combine an extended product and applications assurance warranty for a minimum of 25 years.

C. An Extended Product Warranty shall be provided which warrants functionality of all components used in the system from the date of registration. The Extended Product Warranty shall warrant the installed horizontal and/or backbone copper, and both the horizontal and the backbone optical fiber portions of the cabling system.

D. The Application Assurance Warranty shall cover the failure of the wiring system to support the applications that are designed for the link/channel specifications of ANSI/TIA-568-1-D. These applications include, but are not limited to, 10BASE-T, 100BASE-T, 1000BASE-T, and 155 Mb/s ATM.

E. The contractor shall provide a minimum of a 1 year warranty on the physical installation.

4.2 CONTINUING MAINTENANCE

A. The contractor shall furnish an hourly rate with the proposal submittal, which shall be valid for a period of one year from the date of acceptance. This rate

will be used when cabling support is required to affect moves, adds, and changes to the system (MACs). MACs shall be performed by a certified Contractor and shall be added to the warranty when registered with manufacturer.

4.3 FINAL ACCEPTANCE & SYSTEM CERTIFICATION

A. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation, and successful performance of the cabling system for a two week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a certificate, from the manufacturer, registering the installation.

END OF SECTION 27 06 10

SECTION 28 31 00 - FIRE ALARM SYSTEM

1. GENERAL

A. SCOPE AND RELATED DOCUMENTS

(1) The work covered by and the intent of this section of the specifications includes the furnishing of all labor, equipment, materials, testing, programming and performance of all operations in connection with the installation of the Fire Alarm System as shown on the drawings, as herein specified and as required by the applicable codes.

(2) The requirements of all other applicable conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.

(3) The complete installation shall conform to the applicable sections of NFPA-72-2016, Local Code Requirements and National Electrical Code (Article 760). The requirements of any local fire department and the Authority Having Jurisdiction shall also be observed in the system installation and device layout.

(4) The work included in this section shall be coordinated with related work specified elsewhere in these specifications.

B. QUALITY ASSURANCE

(1) Every component, device, transmitter, software, etc., that are included in the work, to make up a complete Fire Alarm System shall be listed as a product by the manufacturer under the appropriate category by the Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label.

(2) The system power, signal and controls wiring shall be UL listed for Power Limited Applications per NEC 760. All circuits shall be marked in accordance with NEC Article 760.

C. GENERAL

(1) Furnish and install a complete digital multiplex Fire Alarm System as described herein and as shown on the plans; system shall be a one-way emergency voice/alarm communications system to be wired, connected, completely tested, and left in first class operating condition. The system shall use individually-addressable digital multiplex device circuit(s) with individual device supervision, appliance circuit supervision, incoming normal and stand-by power supervision. In general, systems shall include a control panel, manual pull stations, automatic fire detectors, speakers, flashing lights, annunciator, raceways, all wiring, connections to devices, connections to valve tamper switches, water flow switches and mechanical controls, outlet boxes, junction boxes, and all other necessary materials for a complete, operating system.

The fire alarm control panel shall allow for loading or editing of any special instructions or operating sequences as required. No special tools, modems, or an off-board programmer shall be required to program the system to facilitate future system expansion, building parameter changes, or changes as required by local codes. All instructions shall be stored in a resident non-volatile programmable memory.

(2) All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name of each component. Any catalog numbers specified under this section are intended only to identify the type, quality of design, materials, and operating features desired.

The listing of specific catalog numbers and equipment parameters is not intended to limit competition among other manufacturers that propose to supply equivalent equipment and services. Fire alarm systems as manufactured by Simplex, Siemens/Cerberus, Edwards, Honeywell or Notifier will be acceptable.

(3) Equipment submissions for shop drawing review must include a minimum of the following:

a. Complete descriptive data indicating UL listing for all system components.

b. Complete sequence of operations of the system.

c. Complete system wiring diagrams for components capable of being connected to the system and interfaces to equipment supplied by others.

d. A copy of any state or local Fire Alarm System equipment approvals.

e. An Autocad (latest version) produced wiring diagram illustrating the basic floor plan of the building, showing all system wiring and equipment, as well as zoning boundaries and schedule of zone legends as intended to appear on annunciators. Provide three CD-Rom copies of as-built drawings and all system operational software at close of project, to be included in operation and maintenance manuals.

(4) No work shall be done until the drawings are approved by the AHJ.

D. OPERATION

(1) The system alarm operation subsequent to the alarm activation of any manual station or automatic detection device shall be as follows:

a. 1) The appropriate initiating device circuit indicator (red color) shall flash on the control panel until the alarm has been silenced at the control panel. Once silenced, this same indicator shall latch on. A subsequent alarm received after silencing shall flash the subsequent zone alarm indicator on the control panel

and resound alarms and flashing signals. These same conditions shall occur at any remote annunciator.

2) A pulsing alarm tone shall occur within the control panel until silenced.

b. All alarm indicating appliances shall sound until silenced by an alarm silence switch at the control panel (or the remote annunciator, if any).

c. All doors normally held open by door control devices shall close. Doors shall also be released in the event of incoming normal power failure.

d. A supervised signal to notify the local fire department or an approved central station (as required by local codes) shall be activated.

e. A supervised signal shall directly activate, shut down or reconfigure the air handling systems as required by NFPA or as otherwise indicated herein. Provide necessary interlock wiring as required to control mechanical equipment.

f. The Contractor(s) shall coordinate with each other as necessary to provide all required auxiliary contacts, DDC systems interfaces, equipment, etc., as needed to shut down or otherwise control air handling systems per NFPA and all applicable codes.

g. The system shall be wired with two circuits to all Notification devices so that when an alarm is acknowledged, silencing the audibles, the visual units shall continue in operation until the main control panel has been reset. If local codes require other than this arrangement, the system shall be wired in accordance with the code that is applicable.

(2) The alarm indicating appliances shall be capable of being silenced only by authorized personnel operating the alarm silence switch at the main control panel or by use of a similar key operated switch at the remote annunciator (where remote units are provided). A subsequent alarm shall reactivate the signals. Operation of the alarm silence switch shall be indicated by trouble light and audible signal.

(3) The activation of any standpipe water valve tamper switch or sprinkler zone valve tamper switch shall activate a distinctive system supervisory audible signal and illuminate a "Sprinkler Supervisory Tamper Switch" indicator at the system controls (and the remote annunciator[s]). There shall be a distinction in the audible trouble signals between valve tamper switch activation and opens or grounds on fire alarm circuit wiring.

a. Activating the trouble silence switch will silence the supervisory audible signal while maintaining the "Sprinkler Supervisory Tamper" indicator showing the tamper contact is still activated.

b. Restoring the valve to the normal position shall cause the audible signal and visual indicator to pulse at a fixed rate.

c. Activating the trouble silence switch shall silence the supervisory audible signal and restore the system to normal.

(4) Include with the control panel, as an auxiliary function, a built-in test mode that, when activated, will cause the following operation sequence:

a. The city connection circuit shall be disconnected.

b. Control relay functions shall be bypassed.

c. The control panel shall show a trouble condition.

d. The panel shall automatically reset itself.

e. Any momentary opening of an initiating or indicating appliance circuit shall cause the audible signals to sound for a minimum of two seconds to indicate the trouble condition.

E. SUPERVISION

(1) The system shall contain Class "B" (Style "B") independently supervised initiation circuits as required for the zoning indicated. Circuits shall be arranged so that a fault in any one zone shall not affect any other zone. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.

(2) There shall be supervisory initiation circuit(s), as required, for connection of all sprinkler valve tamper switches. Wiring methods which require any fire alarm initiation circuits to perform this function shall be deemed unacceptable; i.e., sprinkler and standpipe tamper switches (N/C contacts) shall NOT be connected to circuits with fire alarm initiation devices (N/O contacts). These independent initiation circuit(s) shall be each labeled "Sprinkler Supervisory Tamper Switch" and shall differentiate between tamper switch activation and wiring faults. Provide individual annunciation for the main post indicator valve and each tamper switch as indicated by the zoning schedule on the plans or as otherwise required by codes. For these circuits and all exterior underground copper circuit wiring, provide proper surge suppression and protection for circuit.

(3) There shall be independently supervised and independently fused indicating appliance circuits as required for alarm audible signals and flashing alarm lamps.

(4) All auxiliary manual controls shall be supervised so that all switches must be returned to the normal (automatic) position to clear system trouble.

(5) Each independently supervised circuit shall include a discrete (amber color) "Trouble" indicator to indicate disarrangement conditions, per each circuit.

(6) The incoming power to the system shall be supervised so that any power failure shall be audibly and visually indicated at the control panel and the annunciator. A green color "power on" indicator shall be displayed continuously while incoming power is present.

(7) The system batteries shall be lead-acid type, supervised so that disconnection or failure of a battery shall be audibly and visually indicated at the control panel (and the annunciator).

(8) Wiring to a remote annunciator (if provided for system) shall be supervised for open and ground conditions. An independent annunciator trouble indicator shall be activated and an audible trouble signal shall sound at the control panel.

F. POWER REQUIREMENTS

(1) The control panel shall receive 120 VAC power via a dedicated circuit. The incoming circuit shall have suitable overcurrent protection within the control panel, as well as at the circuit source. If additional circuits are required for this or other control units, they shall be provided by the Contractor.

(2) If the facility is equipped with an emergency standby power generator, the fire alarm equipment shall be connected to this system, per N.E.C.

(3) The system control panel and auxiliary equipment, such as power supplies shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120 VAC power in a normal supervisory mode for a period of time as required by codes for the building occupancy. There shall be reserve battery capacity to drive all alarm appliances for five-minute indication at the end of this period. The system shall automatically transfer to the standby batteries upon power failure. All battery charging and recharging operating shall be automatic. Batteries, once discharged, shall recharge at a rate that will provide a minimum of 70% capacity in 12 hours, or sooner if required by codes.

(4) All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel.

(5) Power supplies for Notification signals, whether in the main panel or within remote power supply cabinets, shall be designed to provide a minimum of 20% spare capacity for future signals.

G. FIRE ALARM CONTROL PANEL

(1) Where shown on the plans, provide and install the Fire Alarm Control Panel. Construction shall be modular with solid state, microprocessor-based electronics. All visual indicators shall be high contrast, light-emitting diode type.

(2) The control panel shall contain the minimum following features as per plans:

- Minimum Capacity of 120 Control or Monitor Points or greater, to Suit Building Requirements, expandable to 1000 points
- Initiation Device Circuits
- Alarm Indicating Appliance Circuit
- Supervised Annunciator Circuits
- Local Energy City Connection, if required
- Form C Alarm Contacts (2.0 Amps ea., minimum of two unless otherwise required)
- Earth Ground Supervision Circuit
- Automatic Battery Charger, of proper rating
- Standby Battery, Lead/Acid Type
- Resident non-volatile programmable operating system for all operating requirements
- Supervised Manual Evacuation Switch
- Internal power supplies as required for auxiliary functions as indicated
- Auxiliary contacts or relays for auxiliary functions as indicated
- All Custom Software and Programming as required to suit the project requirements

H. SYSTEM SOFTWARE AND PROGRAMMING

(1) Provide all programming and software necessary to place annunciators and controls in full operation. System set-up shall allow for changes in annunciator legends without rewiring or addition of programming or electronics. Furnish initial programming and reprogramming as needed to accommodate changes in the system up to the time of system acceptance by the engineer without extra charge.

I. REMOTE ANNUNCIATOR

(1) Where indicated on the plans, provide and install LCD type annunciator/control panel. The panel shall be of vandal-resistant construction and shall contain a liquid crystal illuminated display for alphanumeric indication of all required functions. The panel shall also contain the following control functions, activated by a master system enable key switch on front panel:

a. Remote system reset switch, to complement main control panel reset switch.

b. Remote alarm signal silence switch.

c. Remote manual evacuation switch, to initiate fire drill functions, same as at main control panel.

d. Remote trouble silence switch to silence trouble alarms in annunciator panel and main control panel.

e. Install panel on properly sized outlet box, 54" AFF to centerline. Panel shall contain tamper-resistant LED test switch in panel, local audible alarm, system power on, trouble LED indicators and master system enable key switch, keyed alike with the main control panel.

(2) Annunciator legends shall be custom, to display both zone number and brief legend indicating the area or device associated with that zone. The legends shall be electronically generated on an alphanumeric display panel. The fire alarm system vendor shall coordinate the legends with the Engineer at shop drawing review.

(3) Wiring between main control panel and annunciator(s) shall be fully supervised, and accomplished over twisted shielded pair and/or THWN wiring as required by the manufacturer, per N.E.C. and NFPA.

J. Local Operating Console

(1) Provide console with equipped microphone at locations shown on plans. Additionally, provide fire alarm system documentation cabinet in this location.

K. PERIPHERAL DEVICES

Note: On fully digital multiplex systems, provide addressable devices, bases or modules for devices listed herein. Each device shall be an individual address on the system. Addressable bases or modules shall be U.L. listed for the device served.

(1) MANUAL PULL STATION

a. Manual stations shall be double action and shall be constructed of high impact, red lexan or cast metal with raised white lettering and a smooth high gloss finish. The manual pull station shall have a hinged front with key lock. Stations shall be keyed alike with the fire alarm control panel. When the station is operated, the handle shall lock open in a protruding manner. Furnish one key for each manual station to owner at close of project, during instruction period. Install per code, whether indicated on the drawings or not.

(2) CEILING-MOUNTED SMOKE DETECTORS, PHOTOELECTRIC TYPE

a. Furnish and install where indicated on the plans or required, ceiling-mounted smoke detectors. Provide separate outlet-box mounted base with auxiliary relay, or standard base, as required.

b. Smoke Detectors shall be listed to U.L. Standard 268 and shall be compatible with their control equipment. Detectors shall be listed for this purpose by Underwriters' Laboratories, Inc. The detectors shall obtain their operating power from the fire alarm panel supervised detection loop. Loss of the operating voltage shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal to be generated at the control panel. Detectors shall be capable of being reset at the main control panel.

c. No radioactive materials shall be used. Detector construction shall provide mounting base with twist-lock detector head. Contacts between the base and head shall be of the bifurcated type using spring-type, self-cleaning contacts. Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection

loop and cause a trouble signal at the control panel. Detector design shall provide full solidstate construction, and compatibility with other normally open fire alarm detection loop devices such as heat detectors, pull stations, etc.

d. To minimize nuisance alarms, voltage and RF transient problems, suppression techniques shall be employed as well as a smoke verification circuit and an insect screen. The detector head shall be easily disassembled to facilitate cleaning.

e. Remote LED alarm indicators shall be installed where required.

f. Smoke detectors (and all other system electronics) shall be shielded to protect circuitry from EMI problems generated by power fields, cellular phones, etc.

g. Special Note: The Contractor installing smoke detectors shall use care in the final positioning of all devices. They shall not be installed closer than 36" from an air diffuser or return grille, closer than 24" from a ceiling/wall intersection, or similar location that would diminish detector performance. Refer to and comply with NFPA 72E, "Standard On Automatic Fire Detectors".

h. Provide smoke detector at each fire alarm system control component, as required by code.

(3) AUTOMATIC HEAT DETECTORS (RATE-OF-RISE TYPE)

a. Automatic heat detectors shall be combination rate-of-rise and fixed-temperature type. When the fixed-temperature portion is activated, the units shall be non-restorable and give visual evidence of such operation. Heat detectors shall be 135, 165 or 195NF, as indicated on plan. Where not indicated, provide 165º F units. Provide as indicated or required.

(4) AUTOMATIC HEAT DETECTORS (FIXED TEMPERATURE TYPE)

a. Where indicated on the plans, provide automatic heat detectors of the non-restorable type, of the temperature rating as indicated or required. Detector heads shall be mounted to an outlet-box mounted base. Provide auxiliary contacts as needed. Provide as indicated or required.

(5) AUDIBLE AND VISUAL UNITS

a. Audible signals shall be polarized and shall be operated by 24 VDC. Each audible assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors will not be accepted. The audible visual units shall be equipped with a xenon-type strobe which shall be semi-flush mounted on 4" square outlet box. Each audible device shall produce a minimum sound pressure level of 92db at 36" on axis. Provide units as manufactured by Wheelock, Inc., or approved equivalent. Locate as indicated or required. All audible tones for same function shall be

identical, per NFPA. Provide sufficient audible units to comply with code for required coverage.

b. The output intensity of all visual units, their locations and mountings shall be in compliance with the latest version of the Americans with Disabilities Act requirements.

c. Audible units and visual units shall be wired to separate Notification circuits, allowing for silencing of audibles with alarm acknowledgment, continuing operation of strobes until system reset. Addressable devices may be used to fulfill this requirement.

d. Provide system-wide synchronization of all visual devices, so that all strobes flash at the same rate and at the same time, complying with A.D.A.

(6) VISUAL UNITS

a. Stand-alone visual indicating units shall be xenon type strobe matching audio-visual units. These devices shall be UL listed and be ceiling or wall mounted. A high-impact clear lens shall project out from backplate. Lettering, if any, shall be oriented upright to the standing viewer. Candela output values of all visual units shall be selected for the covered spaces geometry and size, complying with A.D.A. and NFPA.

(7) DOOR HOLDERS

a. Magnetic door holders shall be 120 volt A.C., and shall have an approximate holding force of 25 lbs or greater, if required to restrain door. The door-mounted portion shall have a plated steel pivot mounted armature with shock absorbing bearing. Unit shall be capable of being either surface, flush, semi-flush or floor mounted as required. Door holders shall be UL listed for their intended purpose. Where door mounted, locate armature 6" down from top and 6" in from strike side of leaf. Where door swing prevents direct contact between armature and holder pole piece, provide non-removable plated chain to close gap as tightly as possible. Verify holder positioning with Architect prior to mounting any devices. Unless otherwise indicated, provide semi-flush mounted holders 6" below top of door leaf as noted above, with blocking in wall to support force of door impact against holder and outlet box. Provide at all needed locations as indicated or required. Coordinate with architectural hardware schedule, as applicable to project.
b. Coordinate with door hardware manufacturer to determine who is purchasing this equipment.

(8) DUCT SMOKE DETECTORS

a. Duct smoke detectors shall be of the solidstate photoelectric type, operating on the light scattering photodiode principle. The detectors shall ignore invisible airborne particles or smoke densities that are below the set alarm point. No radioactive materials shall be used. The basic construction of duct smoke detectors shall be the

same as that previously described for ceiling-mounted smoke detectors. Duct housing couplings shall be slotted to insure proper alignment of the sampling and exhaust tubes. Detector shall have an alarm status LED visible through a transparent cover, panel or in housing.

b. The Contractor shall furnish air duct smoke detectors with template to the sheetmetal or air handling unit installer for installation. Coordinate length of sampling probe required and furnish appropriate length. Probe tube shall be located in accord with manufacturer's recommendations, to give maximum sampling rate of airflow. Provide multiple detectors, as required, if a single device will not provide adequate sensing due to duct size or air velocity. Wire multiple detectors on a single air handling system as a single zone or address unless otherwise required by prevailing codes. Field verify quantity of detectors needed to provide NFPA-compliant coverage of the air handling unit and provide as required.

c. Detector supervised power and alarm wiring (from F.A. control panel) is to be provided by the Contractor. Interlock wiring from auxiliary contacts to stop or otherwise control air handling unit fan motor(s) is to be provided by the Contractor. Provide auxiliary contacts as required. Zone wiring and indication for air duct smoke detectors shall be maintained separate from area detection devices. Detector shall be capable of being reset at the main control panel, and at a local test/reset station.

d. Where air duct smoke detectors are located in other than Mechanical Rooms or in spaces not easily visible, a remote alarm/power indicating LED key reset station shall be installed. These remotes shall be ganged together, if required, and labeled accurately as to which unit is reporting an alarm condition.

e. Where air duct smoke detectors are indicated to be furnished at concealed air handling units above ceilings or smoke damper locations, furnish as outlined above. Also provide remote indicating alarm LED flush in corridor wall at 7'-0" A.F.F. immediately below installation, or as close as practical to installation. The Contractor is to provide control wiring, E.P. switches, etc., as required to operate smoke dampers, as well as the required operating circuit. Coordinate all requirements with the installer of smoke dampers.

f. Ionization - type detectors shall not be utilized for air duct smoke detection.

g. All air duct smoke detector installations and materials shall be in accord with U.L., NFPA, and any other applicable codes.

(9) WEATHERPROOF DEVICES AND EXPLOSION-PROOF DEVICES

a. Where the anticipated atmosphere or installation conditions require weather-proof, explosion-proof or other specially housed devices, they shall be U.L.-listed and NFPA-compliant and provided as indicated or required. Verify installation conditions and indicate type of device on shop drawing submission.

(10) END OF LINE RESISTOR

a. End-of-line devices (if required) shall be flush-mounted, located at 7'-0" A.F.F. in corridor walls or as indicated.

(11) GUARDS FOR DEVICES

a. Where detectors, manual stations, signals, etc., require or are indicated to be furnished with a guard, utilize a U.L. listed unit, compactly covering and compatible with the device. Provide as indicated or required. Guards shall not diminish the performance of any device.

(12) DIGITAL ALARM COMMUNICATOR/TRANSMITTER

a. Provide a U.L.-listed and NFPA-compliant digital alarm communicator/transmitter (D.A.C.T.). Install at telephone terminal board or telephone service entrance and provide supervised wiring to fire alarm control panel as required. This unit may be semi-flush mounted at the F.A.C.P. location with prior approval by the Engineer. It may also be integrated within the main control panel, if U.L.-listed for the purpose.

b. The installation and connection of the D.A.C.T. shall be in compliance with all provisions of N.F.P.A. 71 and all other applicable codes. The installation and connection shall be acceptable to the Authority Having Jurisdiction, as well as the telephone company (or companies) over whose lines the signal(s) will be transmitted. Include any costs associated with telephone company work and services required in bid. Telephone connection shall be in compliance with NFPA 71, chapter five.

c. DACT shall be equipped with additional cellular capability as a backup for reporting to meet NFPA requirements.

d. The D.A.C.T. shall be capable of transmitting all information relative to system status changes due to alarm, trouble, water flow, and any other information as required by current codes applicable to the facility. This information shall be transmitted to a U.L. listed Central Receiving Station, that also is maintained in accord with the requirements of NFPA 71. Connect system to transmit signals as required by Prince George's County local codes.

e. As a part of this contract, the services of a Central Receiving Station shall be engaged for a period of one year from the date of substantial completion, this date as defined elsewhere in these documents. The Central Receiving Station facility selected shall be in full compliance with NFPA and other applicable requirements. The Contractor shall initiate this service, provided on a contract basis, and shall include any costs associated with this provision in his bid. The actual beginning date of the contract with the central receiving station may be adjusted at the discretion of the Engineer, but in no case shall be for less than one year. The contractor shall notify the owner in writing by certified mail that this service has been

contracted for and explain the provisions of this service adequately. A copy of this communication and the return receipt shall be forwarded to the Architect and the Engineer.

(13) REMOTE POWER SUPPLY UNITS FOR PERIPHERAL

a. Provide remote power supply(ies) as required for proper system operation.

b. Remote power supplies shall be provided with local intelligence compatible with the digital multiplex network, so they have a unique address, providing the ability to monitor the supply for loss of power, shorts, grounds and other supervisory functions.

c. Where required by the fire alarm system manufacturer, remote power supplies shall be provided that will provide sufficient current to drive audio/visual or other required devices.

d. These units shall be located in electrical closets, mechanical rooms or similar spaces. They shall not be installed in finished areas, storage rooms, etc., without the permission of the Engineer. All locations shall be indicated on the shop drawing submissions.

e. Provide dedicated 120 volt power circuit(s) from nearby panelboards as required, whether indicated on the plans or not.

L. INSTALLATION

(1) Provide and install the system in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be in a completely separate conduit system from power wiring or other raceway systems. Minimum conduit size shall be 3/4" trade size. Maximum wire fill shall be 40%, for any raceway system.

(2) **Provide all fire alarm cabling in EMT Conduit.**

(3) All junction boxes shall have coverplates painted red and labeled "Fire Alarm". A consistent wiring color code shall be maintained throughout the installation. The number of wiring splices shall be minimized throughout. Excessive wire splicing (as determined by the Engineer), shall be cause for rejection of the work.

(4) All circuit breakers and disconnects serving fire alarm equipment shall be marked in red and clearly labeled as Fire Alarm Circuits.

(5) Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate tradesmen or other contractors.

(6) The Contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of installation.

(7) The manufacturer's authorized representative shall provide on-site supervision of installation, and shall perform the initial "power-up" of the system after he has thoroughly checked the installation.

(8) Operation and maintenance manuals submitted for this project shall list names, license numbers, and telephone numbers of at least two installers that are employed full time by the supplier/manufacturer to install and test fire alarm systems in the installation location.

A floor plan drawing indicating fire alarm devices and wiring only, shall be provided by the manufacturing company for job site use. These drawings shall be approved by the State Fire Marshal's Office or Prince George's County Authority Having Jurisdiction, as appropriate and in accord with code requirements. A copy of this drawing shall be submitted to the Engineer for his review, approval and project records.

M. TESTING

(1) The completed fire alarm system shall be fully tested in accordance with NFPA-72 by the contractor in the presence of the Owner's representative and the Prince George's County Fire Marshal. Upon completion of a successful test, the Contractor shall certify the test results in writing to the Fire Marshal, Owner, General Contractor, Architect and Engineer. Provide one week's written advance notice of the test to all concerned parties.

(2) All auxiliary devices the fire alarm system is connected to, including tamper switches, flow switches, elevator controls, remote receiving stations, etc., shall be fully tested for proper operation where interfacing with the fire alarm system.

(3) The Contractor shall provide a minimum of three hours of instructional time to the Owner in the operation and maintenance of all equipment and components. A receipt shall be obtained from the Owner that this has been accomplished, and a copy forwarded to the Engineer. Provide additional training time if required by the Owner at no charge to the contract or as direct charge to the Owner.

N. WARRANTY

(1) The Contractor shall unconditionally guarantee (except for vandalism or misuse) the completed fire alarm system wiring and equipment to be free from inherent mechanical, software and electrical defects for a period of one year from the date of substantial completion.

(2) The equipment manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two inspections and tests per year.

END OF SECTION 28 31 00

SECTION 31 10 00 - **SITE CLEARING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil, and offsite stockpile area.
5. Removing above- and below-grade site improvements.
6. Temporary erosion and sedimentation-control measures.
7. Remove/demo existing improvements.

B. Related Sections:
1. Section 015000 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities, and temporary erosion- and sedimentation-control measures.

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for materials indicated to be stockpiled onsite or offsite, or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of adjoining existing site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Use sufficiently detailed photographs or videotape.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.

C. Utility Locator Service: Notify PA One Call for area where Project is located before site clearing.

D. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

E. The following practices are prohibited within protection zones (protection zones are assumed to be at the limits of the drip line of any existing tree to remain):
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Erection of sheds or structures.
   4. Impoundment of water.
   5. Excavation or other digging unless otherwise indicated.
   6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

F. Do not direct vehicle or equipment exhaust towards protection zones.

G. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

H. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
   1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Protect existing site improvements to remain from damage during construction.
   1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Engineer.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
   1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.
   1. Arrange with utility companies to shut off indicated utilities.
   2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Excavate for and remove underground utilities indicated to be removed.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
   1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
   2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches below exposed subgrade.
   3. Use only hand methods for grubbing within protection zones.
   4. Chip removed tree branches and stockpile in areas approved by Owner. Contractor is responsible for the legal disposal of all debris.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
   1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches, and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL & FILL STRIPPING & STOCKPILING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to depth of a minimum 6 inches or as identified in the geotechnical report in a manner to prevent intermingling with underlying subsoil or other waste materials.
   1. Remove subsoil and non-soil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
   1. Limit height of topsoil stockpiles to 35 feet.
   2. Do not stockpile topsoil within protection zones.

D. Upon Substantial Completion of the Project, the Contractor shall restore any on site temporary stockpile areas to pre-construction conditions.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Salvage existing items as identified on the drawings to the owner at a location on site.

C.

D. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
   2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other non-recyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 10 00

SECTION 31 20 00 - **EARTH MOVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section. See “Report of Geotechnical Exploration” by David Blackmore and Associates, dated May 14, 2026, included as part of these specifications.

1.2 SUMMARY

A. Section Includes:
1. Preparing subgrades for walks, pavements, and vegetation.
2. Excavating and backfilling for buildings and structures.
3. Subbase course for concrete pavements.
4. Subbase course and base course for asphalt paving.
5. Subsurface drainage backfill trenches.
6. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:
1. Section 015000 "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
2. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Division 31 Section "Dewatering" for lowering and disposing of ground water during construction.
4. Division 32 Section "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.
1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
   1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Engineer. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
   2. Bulk Excavation: Excavation more than 10 feet in width and more than 30 feet in length.
   3. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Engineer. Unauthorized excavation, as well as remedial work directed by Engineer, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed 1 cu. yd. for bulk excavation or 3/4 cu. yd. for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
   1. Equipment for Footing, Trenches, and Pit Excavation: Late-model, track-mounted hydraulic excavator; equipped with a 42-inch- wide, maximum, short-tip-radius rock bucket; rated at not less than 138-hp flywheel power with bucket-curling force of not less than 28,700 lbf and stick-crowd force of not less than 18,400 lbf with extra-long reach boom; measured according to SAE J-1179.
   2. Bulk Excavation: Late-model, track-mounted loader; rated at not less than 230-hp flywheel power and developing a minimum of 47,992-lbf breakout force with a general-purpose bare bucket; measured according to SAE J-732.

I. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

J. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt.

K. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

L. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For each type of the following manufactured products required:
   1. Geotextiles including impermeable liner.
   2. Warning tapes.

B. Samples for Verification: For the following products, in sizes indicated below:
   1. Geotextile: 12 by 12 inches.
   2. Warning Tape: 12 inches long; of each color.

C. Qualification Data: For qualified testing agency. The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests and inspections

D. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
   1. Classification according to ASTM D 2487.
   2. Laboratory compaction curve according to ASTM D 698.

E. Preexcavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

1.5 QUALITY ASSURANCE

A. Blasting is not permitted.

B. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated. The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests and inspections

C. Pre-excavation Conference: Conduct conference at Project site.

D. PennDOT Publication 408 Specifications (latest Edition, as amended).

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify "PA One Call" for area where Project is located before beginning earth moving operations.

C. Do not commence earth moving operations until temporary erosion-and-sedimentation-control measures, specified in Division 31 Section "Site Clearing," are in place.

D. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Erection of sheds or structures.
   4. Impoundment of water.
   5. Excavation or other digging unless otherwise indicated.
   6. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

E. Do not direct vehicle or equipment exhaust towards protection zones.

F. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, GC, SW, SP, SM, SC, ML and CL according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 6 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.
   1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction. Contractor should make every effort to maintain soil within optimum moisture content including: scarifying, windrowing, and re-compaction at no additional cost to the Owner.

D. Gravel Paving & Subbase Material: PennDOT No. 2A material, as defined by PennDOT Publication 408 (latest edition, as amended).

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Imported Fill: Select granular material free of organic matter, ash, cinders, and demolition debris and conforming to the following:
   1. Particle size distribution that is well-graded
   2. Plasticity Index less than 10
   3. Liquid Limit less than 30

4. Less than 15 percent by weight rock fragments larger than 3” with no particle size exceeding 6”, less than 30 percent by weight larger than 3/4" and less than 30 percent smaller than the No. 200 sieve

G. Bedding Course: In accordance with PennDOT Publication 408 Specifications (latest Edition, as amended) for all drainage piping and structures, in accordance with utility providers for all other utility trenches and structures.

H. Drainage Course: Narrowly graded mixture of washed crushed stone or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Sand: ASTM C 33; fine aggregate.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: In accordance with PennDOT Publication 408 Specifications (latest Edition, as amended), Section 212 for Class 1 Geotextile.

B. Separation Geotextile: In accordance with PennDOT Publication 408 Specifications (latest Edition, as amended), Section 212 for Class 4 Geotextile.

2.3 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:
1. Red: Electric.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
   1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

C. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others.

3.3 EXPLOSIVES

A. Blasting is not permitted.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation**:** Excavate to elevations, lines, and dimensions as required by the Contract Drawings, regardless of the character of surface and subsurface conditions encountered. No changes in the Contract Sum or the Contract Time will be authorized.
   1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
   2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
      a. 24 inches outside of concrete forms other than at footings.
      b. 12 inches outside of concrete forms at footings.
      c. 6 inches outside of minimum required dimensions of concrete cast against grade.

d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
e. 6 inches beneath bottom of concrete slabs-on-grade.
f. 6 inches beneath pipe in trenches, and 24 inches wider than pipe.
g. 12 inches beneath bottom of pavement subgrade.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
   1. Excavations for Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree-and Plant-Protection Zones:
   1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades. Refer to PennDOT publication 408 (latest edition, as amended).

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavation shall be in accordance with PennDOT Publication 408 Specifications for all storm sewer piping and in accordance with the requirements of the associated utility provider for all other utilities.

C. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.
   1. Clearance: As indicated.

D. Trench Bottoms: Trench Bottoms: Excavate trenches to the bottom of proposed pipe bedding to allow for placement of bedding course. Hand excavate for bell of pipe.

3.8 SUBGRADE INSPECTION

A. Notify Engineer when excavations have reached required subgrade.

B. If Engineer determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

C. Proof-roll subgrade and undercut subgrade where required with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under utility pipe and construction other than footings and foundations as directed by Engineer.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
   2. Refer to Section 013200 Construction Progress Documentation for more information regarding offsite soil stockpile requirements.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:
   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.
   3. Testing and inspecting underground utilities.
   4. Removing concrete formwork.
   5. Removing trash and debris.
   6. Removing temporary shoring, bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Backfill shall be placed in accordance with PennDOT Publication 408 Specifications for all storm sewer piping and in accordance with the requirements of the associated utility provider for all other utilities.

C. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

D. Backfill voids with satisfactory soil while removing shoring and bracing.

E. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.
   1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:
   1. Under grass and planted areas, use satisfactory soil material.
   2. Under walks and pavements, use satisfactory soil material.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
   1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:
   1. Under structures, pavements, compact each layer of backfill or fill soil material at 98 percent.
   2. Under walkways, compact each layer of backfill or fill soil material at 98 percent.
   3. Under turf or unpaved areas, compact each layer of backfill or fill soil material at 95 percent.
   4. For utility trenches, compact each layer of initial and final backfill soil material at 98 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between adjacent existing grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Grass or Unpaved Areas: Plus or minus 1 inch.
   2. Walks: Plus or minus 1/4 inch.
   3. Pavements: Plus or minus 1/4 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.17 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course under pavements and walks as follows:
   1. Place base course material over subbase course under hot-mix asphalt pavement in accordance with PennDOT Publication 408 Specifications (latest Edition, as amended).

3.18 FIELD QUALITY CONTROL

A. Testing Agency: The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
   1. Paved Areas: Refer to PennDOT Publication 408, Section 210 – subgrade.
   2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet or less of trench length, but no fewer than two tests.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
   1. Scarify or remove and replace soil material to depth as directed by Engineer; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.20 DISPOSAL / TRANSPORT OF SURPLUS AND WASTE MATERIALS

A. Adjust erosion control measures as necessary to compensate for size and location of topsoil stockpile.
   1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.
   2.
   3.
   4. END OF SECTION 31 20 00

SECTION 31 23 14 - SYNTHETIC TURF BASE PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Site evaluation.
   2. Bulk excavation and construction of a stable subgrade.
   3. Excavation of a perimeter drainage collector network and installation of the drainage grid system.
   4. Construction of a stable and permeable aggregate layer.

B. Modifications to the design criteria described herein may become necessary depending on the soil conditions.

C. Site Evaluation:
   1. The overall soil conditions and drainage properties of the location should be evaluated by a competent testing laboratory.
   2. The laboratory, Professional, and synthetic turf manufacturer should make the final recommendation concerning the suitability of the site. The synthetic turf manufacturer shall make the design recommendations for the construction.

D. Synthetic turf base preparation shall be in compliance with the turf manufacturers' standards.

1.2 REFERENCES

A. ASTM International:
   1. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)).
   2. ASTM D751 - Standard Test Methods for Coated Fabrics.
   3. ASTM D1204 - Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.
   4. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
   5. ASTM D3385 - Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer.
   6. ASTM F1551 - Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials.

1.3 SUBMITTALS

A. Section 01 33 00 – Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Sub drain (underdrain) system, including details and layout.

C. Product Data: Provide product information and samples of the proposed underdrain material.

D. Provide sieve analysis and sample of material proposed for use as the stone base and base fine top aggregate for the synthetic turf system.

E. The contractor shall provide a survey of the finished base preparation with grades provided, and shall be by a PA Registered Surveyor, to be approved by the turf manufacturer prior to turn-over of the base preparation.

PART 2 – PRODUCTS

2.1 UNDER DRAIN SYSTEM

A. Non-Woven Geotextile Fabric: Verify surface elevations of the finished subgrade. Geotextile shall be applied between the subgrade and the impermeable liner, as well as between the stone bedding and the impermeable liner specified below. The surface elevations must conform to the elevations shown on Drawings. Non-woven polypropylene geotextile fabric shall be chemically and biologically inert and shall be equivalent to the following:

a. For the geotextile between the subgrade and the impermeable liner, utilize GTEX8 (by Raven Engineered Films, Sioux Falls, SD) or approved equal.

b. For the geotextile between the stone bedding and the impermeable liner, utilize GTEX10 (by Raven Engineered Films, Sioux Falls, SD) or approved equal.

B. Impermeable Liner: Prior to under drain system construction, the subgrade surface is to be uniform and free of rocks, depressions, voids, and irregularities that might damage liner. Install permeable liner where indicated on the drawings (under all new synthetic turf) in accordance with manufacturer's written recommendations, and in accordance with directions above to include geotextile fabric on both sides of liner for protection.

1. Impermeable liner shall be 40 MIL blended linear polyethylene, Hydraflex H-Series (by Raven Engineered Films, Sioux Falls, SD), or approved equal. All components of the manufacturer's specification shall be met.
2. Overlap joints a minimum of 12 inches. All laps shall be overlapped in direction the water flows.
3. Place a suitable amount of ballast on the liner to prevent movement by wind. The ballast shall be in a form which will not damage liner.
4. Direct loading on the liner by traffic shall not be allowed. A minimum of 4 inches of material cover must be placed prior to traffic.
5. Punctured or torn liner shall be repaired by overlapping additional liner and jointing in accordance with manufacturer's recommendations.
6. The liner must completely line perimeter trench in a continuous manner.

C. Field Composite Drains:

Physical Property	Requirements
Material	Nylon
Thickness w/ Fabric	0.9 inches
Width w/ Fabric	11.9 inches
Total Weight	31.3 ounce/square yard
Core Weight	20.6 ounce/square yard

1. Install composite under drain conduits at spacing shown on the drawings on top of the impermeable liner, securing to liner every 15 linear feet with duct tape or other approved method. Ends of these composite drains should turn down into the perimeter drain collector header system.
2. Drainage system shall be installed to support rainwater percolation at a minimum rate of 15 inches per hour.
3. ADS AdvanEdge; Phone 800-821-6710 or approved equal.

D. Perimeter Collectors Drains:
1. Place 12 inches or greater O.D. slotted perforated corrugated HDPE underdrain pipes in the perimeter collector trenches; the centerline of the pipe shall coincide with the centerline of trench, which dimensions are shown on the drawings.
2. The pipes shall be strong and capable of withstanding the anticipated loading without deformation.
3. Each header should be designed to handle the maximum rainfall in that particular location.
4. Collector headers must be drained to an acceptable, efficient storm sewer, or approved discharge outlet, as approved by the Professional.
5. Place a minimum of 4 inches clean, crushed aggregate on the sides of the under drain pipes and headers, and minimum of 6 inches of the aggregate on top of the pipe network, unless shown otherwise on the drawings; compact suitably.

2.2 AGGREGATE LAYER

A. Uniformly mixed processed stone shall be placed over the entire prepared subbase and impermeable liner, and the composite drain system. The aggregate shall comprise of a minimum 5-3/4” inch compacted, stable, permeable, and processed stone. Base aggregate shall be a coarse aggregate with a fine top aggregate. The finishing stone aggregate shall not exceed a 1-inch thickness. Care shall be taken to maintain the grade designed for the subbase. The capability of the processed stone drainage layer to meet the stability and permeability requirement must be determined by a certified laboratory prior to construction of the course. The processed stone layer shall be compacted to a minimum density of 95 percent. Nuclear density tests should be performed during aggregate placement and rolling to ensure specified compaction.

B. Material shall be a 100 percent fractured, by mechanical means, with elongated characters on each individual particle larger than 1/4 inch. Material shall be devoid of mineral fines. All particles smaller than 1/4 inch shall be produced by manufactured means only. Rounded sands or aggregates are prohibited.

C. Alterations Typical aggregate or aggregate blends found acceptable as a processed stone drainage course must conform to the following gradation:

PennDOT 2B (#57)

Sieve Sizes

Sieve	Metric (mm)	Percent Passing by Weight
1 1/2 inch	37.5	100
1 inch	25	95 – 100
1/2 inch	12.5	25 – 60
No. 4	4.75	0 – 10
No. 8	2.63	0 – 5

Base Fine Top Aggregate:
PennDOT 1B (#8)

Sieve	Metric (mm)	Percent Passing by Weight
1/2 inch	12.5	100
3/8 inch	9.5	85 – 100
No. 4	4.75	10 – 30
No. 8	2.63	0 – 10
No. 16	1.18	0 – 5

PART 3 – EXECUTION

3.1 EXCAVATION

A. A single benchmark must be established prior to any excavation and maintained by a licensed surveyor of record during the entire construction process. The site should then be excavated to a depth per plan design. During excavation, all grass, topsoil, etc., should be stripped, in their entirety, and stockpiled in pre-selected areas where it will not interfere with the Work.

B. In the event of over-excavation, select-fill material shall be used to achieve design subgrade elevations. Select materials shall be composed of natural materials consisting of hard, durable particles of sand or stone together with silt and/or clay material.

C. The Testing Agency will determine whether the materials in the excavated areas are suitable for use as select-fill. All unsuitable material shall be removed and all new materials shall be approved by the Testing Agency prior to use.

D. The subgrade shall be constructed using approved select-fill material. This material shall be placed in lifts not greater than 6 inches in depth. Each lift shall be compacted separately. The moisture in the soil, at the time of compaction, shall be uniformly distributed and should be within 90 and 120 percent range of the optimum. Within these limits, the Testing Agency will determine the proper moisture level to be used, by standard proctor.

E. The select-fill material in the first layer shall be rolled until the course has been uniformly compacted to a minimum 95 percent of the maximum density. The second and succeeding courses shall be placed and mixed and then compacted as specified in the first course.

F. The finished surface of the subgrade shall have a finished grade in accordance with the Drawings and Project Manual. The subgrade shall be established to within a tolerance of +0 to -1/2 inches of the designed subgrade elevation.

G. Proof roll and mark “soft spots” for additional compaction or correction. Use static tandem drum-type roller of not less than five (5) tons weight. Proof rolling operations must be performed in the presence of the Owner’s representative and/or Professional.

H. Excavate perimeter drainage collector trenches minimum as indicated on Drawings. The trenches should be excavated with a minimum of 0.5 percent slope starting from the low point of the drainage system at the outlet extending toward the high point(s). Design of the collector trenches should incorporate the following:
   1. All loose debris shall be removed from the trenches.
   2. The trenches shall be backfilled using premium materials and compacted by hand tamping (or equivalent machinery) to a minimum 95 percent of the maximum density.

I. The subbase and curbs shall be inspected by the Contractor by means of a laser level and plotted on a 25 foot grid. Based upon the Professional’s and Contractor’s inspection of the spot elevations, the Contractor shall fine grade the subbase suitably - including properly rolling and compacting the base. Professional and Contractor shall not approve the subbase for tolerance to grade without obtaining the required spot elevations.

3.2 INSTALLATION OF PERMEABLE PROCESSED STONE

A. Delivery Moisture Content: Processed stone must contain 90 percent to 110 percent of the optimum moisture content to ensure that fines do not migrate in transit or during placement and to facilitate proper compaction; this is critical. The Contractor shall ensure that aggregate leaving the source plant meet this requirement. The Contractor is required to apply water to the processed stone on site to attain and maintain this minimum moisture content.

B. Handling and Placement:
   1. Prior to aggregate placement, remove any excess or contaminated backfill from the drainage trenches.
   2. Should any separation of the materials occur, during any stage of the spreading or stockpiling, the Contractor must immediately remove and dispose of segregated material and correct or change handling procedures to prevent any further separation. Double handling of materials is not allowed.
   3. The Contractor shall utilize laser control equipment for the grading of the processed stone to ensure accuracy in the grade tolerances of +0 inch to -1/8 inch.
   4. Install processed stone base, from sideline toward centerline, parallel to the composite drain network, to the lines and grades shown on the Drawings. Under

no circumstance shall the material be pushed more than 30 feet from the point of discharge.

5. The Contractor shall shape the complete surface of the processed stone and continue until the deviation from the required elevation does not exceed a maximum deviation from grade of +0 inch to -1/8 inch in ten feet, when measured in any direction using a 10 foot straight-edge.
6. Each layer must be spread uniformly with equipment that will not cause perceptible separation in gradation (segregation of the aggregates), preferably a self-propelled paving machine or small laser controlled low ground pressure (LPG) dozer.

C. Compaction and Planarity:
   1. The processed stone shall be compacted to a minimum density of not less than 95 percent of maximum density as determined by ASTM D698 and measured using a nuclear method.
   2. Proof-roll wherever possible and mark "soft spots" for additional compaction or correction. Use static tandem drum-type roller of not less than five (5) tons weight. Proof rolling operations must be performed in the presence of the Testing Agency.
   3. The finished surface shall not deviate (tolerance-to-grade) from designated compacted grade. This means that the surface shall not deviate more than 1/8 inch in 10 feet (any direction) when placed under a 10 foot straight edge. This tolerance is required over the entire field.

D. Areas that deviate should be marked with spray paint and corrected with 3/8 inch limestone chips and rolled tight to achieve proper density. Such remedial actions should be done by hand and rechecked by means of test procedures described above.

E. Testing:
   1. The surface of the processed stone course shall be well drained at all times. No standing water shall be permitted at any time. The permeability of the aggregate shall be checked per ASTM F1551/DIN 18035 Part 7 (preferred), ASTM D2434 (constant head), or ASTM D3385 (double-ring) testing methods. A minimum of five (5) test samples shall be taken over the field or as otherwise directed by the Professional.
   2. All test results will be logged and documented by the Professional or Testing Agency. If at any time the processed stone base does not meet specifications, it shall be the Contractor's responsibility to restore, at his expense, the processed stone base to the required grade, cross-section and density.
   3. After the Contractor has independently confirmed compliance with all the above tolerances (planarity and elevation verified by a licensed surveyor and compaction, gradation, & permeability verified by Testing Agency), the Contractor shall notify the appropriate party and schedule a final inspection for approval. The Contractor shall make available an orbital laser system to the inspection team for the inspection process.
   4. Test result shall be provided to the Professional for compaction, planarity and permeability for compliance with specifications.

END OF SECTION 31 23 14

SECTION 31 23 19 - DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes construction dewatering, if determined to be required.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 FIELD CONDITIONS

A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

PART 3 - EXECUTION

3.1 PREPARATION

A. Provide temporary grading to facilitate dewatering and control of surface water.

B. Protect and maintain temporary erosion and sedimentation controls.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Place dewatering system into operation to lower water to specified levels before excavating below ground-water level.

C. Provide standby equipment on-site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails.

3.3 OPERATION

A. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

B. Operate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.

1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
2. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
3. Maintain piezometric water level a minimum of 24 inches below bottom of excavation.

C. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

3.4 FIELD QUALITY CONTROL

A. Survey-Work Benchmarks: Resurvey benchmarks regularly during dewatering and maintain an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Professional if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

END OF SECTION 31 23 19

SECTION 31 50 00 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes temporary excavation support and protection systems, if required.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Shop Drawings: For excavation support and protection system, prepared by or under the supervision of a qualified professional engineer.

B. Delegated-Design Submittal: For excavation support and protection systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Professional Engineer: Experience with providing delegated-design engineering services of the type indicated, including documentation that engineer is licensed in the state in which Project is located.

B. Contractor Calculations: For excavation support and protection system. Include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Existing Conditions: Using photographs or video recordings, show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by inadequate performance of excavation support and protection systems. Submit before Work begins.

1.5 CLOSEOUT SUBMITTALS

A. Record Drawings: Identify locations and depths of capped utilities, abandoned-in-place support and protection systems, and other subsurface structural, electrical, or mechanical conditions.

1.6 FIELD CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility-serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Professional no fewer than two days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Professional's written permission.

B. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design excavation support and protection systems to resist all lateral loading and surcharge, including but not limited to, retained soil, groundwater pressure, adjacent building loads, adjacent traffic loads, construction traffic loads, material stockpile loads, and seismic loads, based on the following:

1. Compliance with OSHA Standards and interpretations, 29 CFR 1926, Subpart P.
2. Compliance with requirements of authorities having jurisdiction.
3. Compliance with utility company requirements.
4. Compliance with railroad requirements.

2.2 MATERIALS

A. Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 3 inches.

D. Shotcrete: Comply with Section 033713 "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.

E. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

F. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

G. Tiebacks: Steel bars, ASTM A 722/A 722M.

H. Tiebacks: Steel strand, ASTM A 416/A 416M.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Locate excavation support and protection systems clear of permanent construction, so that construction and finishing of other work is not impeded.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.

3.2 SOLDIER PILES AND LAGGING

A. Install steel soldier piles before starting excavation.

1. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement.
2. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging.
3. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier piles as excavation proceeds.

1. Trim excavation as required to install lagging.
2. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

3.3 TIEBACKS

A. Drill, install, grout, and tension tiebacks.

B. Test load-carrying capacity of each tieback, and replace and retest deficient tiebacks.

1. Have test loading observed by a qualified professional engineer responsible for design of excavation support and protection system.

C. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.4 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Professional.
2. Install internal bracing if required to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 MAINTENANCE

A. Monitor and maintain excavation support and protection system.

B. Prevent surface water from entering excavations by grading, dikes, or other means.

C. Continuously monitor vibrations, settlements, and movements to ensure stability of excavations and constructed slopes and to ensure that damage to permanent structures is prevented.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and earth and hydrostatic pressures.

1. Remove in stages to avoid disturbing underlying soils and rock or damaging structures, pavements, facilities, and utilities.
2. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction, and abandon remainder.
3. Fill voids immediately with approved backfill compacted to density specified in Section 312000 "Earth Moving."
4. Repair or replace, as approved by Engineer, adjacent work damaged or displaced by removing excavation support and protection systems.

B. Leave excavation support and protection systems permanently in place.

END OF SECTION 31 50 00

SECTION 32 12 16 - **ASPHALT PAVING**

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. Materials and workmanship shall conform to applicable requirements of PennDOT, Publication 408 (latest edition, as amended).

1.2 SUMMARY

A. Section Includes:

B.
1. Cold milling of existing hot-mix asphalt pavement.
2. Hot-mix asphalt paving.
3. Hot-mix asphalt patching.
4. Hot-mix asphalt paving overlay.
5. Asphalt surface treatments.
6. Pavement-marking paint and thermoplastic markings.

C. Related Sections:
1. Division 31 Section "Earthwork" for aggregate subbase and base courses and for aggregate pavement shoulders.

1.3 DEFINITION

A. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
1. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
2. Job-Mix Designs: For each job mix proposed for the Work.

B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Qualification Data: For qualified manufacturer and Installer.

D. Material Certificates: For each paving material, from manufacturer.

E. Material Test Reports: For each paving material.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by PENNDOT.

B. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests and inspections.

C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of PENNDOT for asphalt paving work.

D. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
      a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
      b. Review condition of subgrade and preparatory work.
      c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
      d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Apply asphalt materials and pavement marking paint

B. in accordance with the specifications set forth in PENNDOT publication 408, as amended.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Aggregate shall be provided in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

2.2 ASPHALT MATERIALS

A. General: Asphalt materials shall be provided in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

2.3 AUXILIARY MATERIALS

A. General: The following auxiliary materials shall be provided in accordance with the specifications set forth in PENNDOT Publication 408, as amended.
   1. Joint Sealant
   2. Pavement marking paint
   3. Thermoplastic Pavement Markings

2.4 MIXES

A. General: Hot-Mix Asphalt shall be provided in accordance with the specifications set forth in PENNDOT Publication 408, as amended. Payment is in accordance with terms of contract. **There is no asphalt escalator associated with this project.**

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry and in suitable condition to begin paving.

B. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Professional, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PATCHING

A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.

B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.
   1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
   2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

C. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.

3.3 REPAIRS

A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
   1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

B. Crack and Joint Filling: Remove existing joint filler material from cracks or joints to a depth of 1/4 inch Insert depth.
   1. Clean cracks and joints in existing hot-mix asphalt pavement.
   2. Use emulsified-asphalt slurry to seal cracks and joints less than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.
   3. Use hot-applied joint sealant to seal cracks and joints more than 1/4 inch wide. Fill flush with surface of existing pavement and remove excess.

3.4 SURFACE PREPARATION

A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.

B. Tack Coat: Apply tack coat in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

3.5 PLACING HOT-MIX ASPHALT

A. Machine place hot-mix asphalt in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

3.6 JOINTS

A. Construct joints in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

3.7 COMPACTION

A. General: Compaction and rolling shall be performed in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

B. Repairs: Repairs shall be performed in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

C. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

D. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.8 INSTALLATION TOLERANCES

A. Pavement Thickness: Compact each course to produce the thickness indicated within the tolerances outlined in PENNDOT Publication 408, as amended.

B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the tolerances outlined in PENNDOT Publication 408, as amended.

3.9 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Engineer.

B. General: Apply pavement-marking paint and thermoplastic pavement markings in accordance with the specifications set forth in PENNDOT Publication 408, as amended

3.10 FIELD QUALITY CONTROL

A. Testing Agency: The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests and inspections.

B. Testing: Testing shall be performed in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

C. Replace and compact hot-mix asphalt where core tests were taken.

D. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.11 DISPOSAL

A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 12 16

SECTION 32 13 13 – CEMENT CONCRETE AND CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:

B.
1. Concrete Curb
2. Concrete Sidewalks
3. Concrete footings for posts and furnishings

C. Related Sections include the following:
1. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.
2. Division 32 Section "Concrete Pavement Joint Sealants" for joint sealants of joints in concrete pavement and at isolation joints of concrete pavement with adjacent construction.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

1.4 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Qualification Data: For manufacturer.

D. Material Test Reports: From a qualified testing agency (see 1.5C. below) indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

E. Material Certificates: Signed by manufacturers certifying that each of the following materials complies with requirements:
1. Cementitious materials.
2. Steel reinforcement and reinforcement accessories.
3. Fiber reinforcement.
4. Admixtures.
5. Curing compounds.
6. Applied finish materials.
7. Bonding agent or epoxy adhesive.
8. Joint fillers.

F. Field quality-control test reports.

G. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94/C 94M requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

B. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

C. Concrete Testing Service: The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests.

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
1. Before submitting design mixtures, review concrete pavement mixture design and examine procedures for ensuring quality of concrete materials and concrete pavement construction practices. Require representatives, including the following, of each entity directly concerned with concrete pavement, to attend conference:
a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete producer.
d. Concrete pavement subcontractor.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 CURB

A. Curbing construction products shall meet the requirements of PENNDOT Publication 408, Section 630, “Plain Cement Concrete Curb”, as amended.

2.2 SIDEWALK

B. Sidewalks shall be constructed in accordance with PENNDOT Publication 408, Section 676, “Cement Concrete Sidewalks”, as amended.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 CONCRETE PLACEMENT, FINISHING, PROTECTION, CURING

A. Sidewalks shall be constructed in accordance with PENNDOT Publication 408, Section 676, “Cement Concrete Sidewalks”, as amended.

B. All joints shall be hand tooled.

C. Provide expansions joints per PennDOT reference above between all areas of new and existing concrete.

3.4 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:
   1. Elevation: 1/4 inch.
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/4 inch.
   4. Joint Spacing: 3 inches.
   5. Contraction Joint Depth: Plus 1/4 inch, no minus.
   6. Joint Width: Plus 1/8 inch, no minus.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: The owner shall engage and pay for a qualified independent testing agency to perform material evaluation tests.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.
      a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
   2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
   6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.
      a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.

D. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer.

G. Remove and replace concrete where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Prepare test and inspection reports.

3.6 REPAIRS AND PROTECTION

A. Remove and replace concrete that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Engineer, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 13

SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Expansion and contraction joints within cement concrete pavement.
   2. Joints between cement concrete and asphalt pavement.

B. Related Requirements:
   1. Division 32 Section “Asphalt Paving” for constructing joints between concrete and asphalt pavement.
   2. Division 32 Section "Concrete Paving” for constructing joints in concrete

1.3 SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm) wide joints formed between two 6-inch (150-mm) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

C. Paving-Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant color.

D. Qualification Data: For installer. Retain “Product Certificates” Paragraph below to require submittal of product certificates from manufacturers.

E. Product Certificates: For each type of joint sealant and accessory.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

C. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
   5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those.

D. Product Testing: Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing of current sealant products within a 36-month period preceding the Notice to Proceed with the Work.

   1. Testing Agency Qualifications: An independent testing agency qualified. According to ASTM C 1021 for testing indicated, as documented according to ASTM E 548

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products referenced in PENNDOT Publication 408, as amended.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.3 COLD-APPLIED JOINT SEALANTS

A. General: Cold-applied joint sealants shall be provided in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

2.4 HOT-APPLIED JOINT SEALANTS

A. General: Hot-applied joint sealants shall be provided in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

2.5 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

2.6 PRIMERS

A. Primers: Provide primers in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

B. Joint Priming: Prime joint substrates in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Install joint sealants in accordance with the specifications set forth in PENNDOT Publication 408, as amended.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 32 13 73

SECTION 32 17 13 - PARKING BUMPERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes concrete wheel stops.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of exposed finish requiring color selection.

C. Samples for Verification: For wheel stops, 6 inches (150 mm) long showing color and cross section; with fasteners.

PART 2 - PRODUCTS

2.1 PARKING BUMPERS

A. Concrete Wheel Stops: Precast, steel-reinforced, air-entrained concrete, 4000-psi (27.6-MPa) minimum compressive strength, [manufacturer's standard height and width] 4-1/2 inches (115 mm) high by 9 inches (225 mm) wide by 72 inches (1800 mm) long. Provide chamfered corners, transverse drainage slots on underside, and a minimum of two factory-formed or -drilled vertical holes through wheel stop for anchoring to substrate.

1. Surface Appearance: Free of pockets, sand streaks, honeycombs, and other obvious defects. Corners shall be uniform, straight, and sharp.
2. Surface Sealer: Manufacturer's standard salt-resistant, clear sealer, applied at precasting location.
3. Mounting Hardware: Galvanized-steel hardware as standard with wheel-stop manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install wheel stops according to manufacturer's written instructions unless otherwise indicated.

B. Install wheel stops in bed of adhesive before anchoring.

C. Securely anchor wheel stops to pavement with hardware in each preformed vertical hole in wheel stop as recommended in writing by manufacturer. Recess head of hardware beneath top of wheel stop.

END OF SECTION 32 17 13

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes painted markings applied to asphalt pavement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to marking pavement including, but not limited to, the following:

    a. Pavement aging period before application of pavement markings.
    b. Review requirements for protecting pavement markings, including restriction of traffic during installation period.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include technical data and tested physical and performance properties.

B. Shop Drawings: For pavement markings.

1. Indicate pavement markings, colors, lane separations, defined parking spaces, and dimensions to adjacent work.
2. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.

C. Samples: For each exposed product and for each color and texture specified; on rigid backing, 8 inches (200 mm) square.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of Pub. 111 of PennDOT standards for pavement-marking work.

1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 55 deg F (12.8 deg C) for water-based materials, and not exceeding 95 deg F (35 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Sherwin-Williams

B. 3M

C. USSC

2.2 PERFORMANCE REQUIREMENTS

A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", the ABA standards of the Federal agency having jurisdiction and ICC A117.1 .

2.3 PAVEMENT-MARKING PAINT

A. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than 45 minutes.

1. Color: White, Blue.

B. Glass Beads: AASHTO M 247, Type 1 made of 100 percent recycled glass.

1. Roundness: Minimum 80 percent true spheres by weight.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is dry and in suitable condition to begin pavement marking according to manufacturer's written instructions.

B. Proceed with pavement marking only after unsatisfactory conditions have been corrected.

3.2 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.

B. Allow paving to age for a minimum of **30** days before starting pavement marking.

C. Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils (0.4 mm).

1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to pavement. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal. (0.72 kg/L).

3.3 PROTECTING AND CLEANING

A. Protect pavement markings from damage and wear during remainder of construction period.

B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 17 23

SECTION 32 17 26 - TACTILE WARNING SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Detectable warning unit pavers.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for concrete walkways serving as substrates for tactile warning surfacing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Initial Selection: For each type of exposed finish requiring color selection.

C. Samples for Verification: For each type of tactile warning surface, in manufacturer's standard sizes unless otherwise indicated, showing edge condition, truncated-dome pattern, texture, color, and cross section; with fasteners and anchors.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For tactile warning surfacing, to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Provide composite Cast In Place Replaceable Tactile Warning Surface Tiles (REP) as produced by a single manufacturer with a minimum of five years' experience in manufacturing Cast In Place Replaceable Tactile Warning Surface Tiles (REP).

B. Installer's Qualifications: Engage an experienced installer certified in writing by the Tactile Warning Surface manufacturer, who has successfully completed Tactile

Warning Surface installations similar in material, design, and extent to that indicated for the Contract.

C. Cast In Place Replaceable Tactile Warning Surface Tiles (REP) must be compliant with ADAAG, PROWAG, and CA Title 24 requirements. Division of the State Architect IR 11B-3 (1/26/05) and IR 11B-4 (1/01/11). IR 11B-4 (1/01/11) removed the requirement for a “staggered” pattern and now calls for the “square grid” (in-line) pattern.

A. Cast In Place Replaceable Tactile Warning Surface Tiles (REP) shall meet or exceed the following test criteria using the most current test methods:
1. Compressive Strength: 28,900 psi minimum, when tested in accordance with ASTM D695.
2. Flexural Strength: 29,300 psi minimum, when tested in accordance with ASTM D790.
3. Water Absorption: Not to exceed 0.10%, when tested in accordance with ASTMD570.
4. Slip Resistance: 1.05 minimum wet and 1.18 dry static coefficient of friction when tested in accordance with ASTM C1028.
5. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.
6. Salt and Spray Performance of Tactile Warning Surface: No deterioration or other defects after 200 hours of exposure, when tested in accordance with ASTM-B117.
7. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, and antifreeze, when tested in accordance with ASTM D543.
8. Abrasion Resistance: 500 minimum, when tested in accordance with ASTM C501.
9. Accelerated Weathering of Tactile Warning Surface when tested by ASTM-G155 or ASTM G151 shall exhibit the following result: $\Delta E<5.0$ at 2,000 hours minimum exposure.
10. Tensile Strength: 11,000 psi minimum, when tested in accordance with ASTM D638.
11. AASHTO-H20 Load Bearing Test: No Damage at 16,000# loading.
12. Freeze/Thaw/Heat: No deterioration when tested in accordance with ASTM C 1026

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Adhesive Application:

1. Apply adhesive only when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (2 deg C) for 12 hours immediately before application. Do not apply when substrate is wet or contains excess moisture.

C. Weather Limitations for Mortar and Grout:

1. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks, and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.

a. When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set unit pavers within 1 minute of spreading setting-bed mortar.

1.8 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of tactile warning surfaces that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering and wear.
b. Separation or delamination of materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TACTILE WARNING SURFACING, GENERAL

A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for tactile warning surfaces.

1. For tactile warning surfaces composed of multiple units, provide units that when installed provide consistent side-to-side and end-to-end dome spacing that complies with requirements.

B. Source Limitations: Obtain each type of tactile warning surfacing, joint material, setting material, anchor, and fastener from single source with resources to provide materials and products of consistent quality in appearance and physical properties.

2.2 DETECTABLE WARNING PANELS

A. Detectable Warning Panels: Cast-In-Place (wet set) Replaceable Tactile Panels as manufactured by ADA Solutions Inc., Chelmsford, MA (Phone: 800-372-0519, Fax: 978-262-9125, Web Site: www.adatile.com , E: info@adatile.com), or approved equal.

1. Length and Width: Rectangular REP Tile: 2.35" Dome Spacing: 24"x36", 24"x48", 24"x60", 36"x48", 36"x60", as needed to conform to ADA requirements
2. Radius REP Tile: 1.6" - 2.4" Dome Spacing [24"x33.25"]
3. Dome Spacing and Configuration: Manufacturer's standard compliant spacing, in manufacturer's standard pattern.
4. Color: Brick Red per Federal Standard 595B Table IV, Color No. 20109.
5. Cleaning materials used on site shall have code acceptable low VOC solvent content and low flammability.
6. The Specifications of the concrete, sealants and related materials shall be in accordance with the Contract Documents and the guidelines set by their respective manufacturers.

2.3 EQUIPMENT

A. Contractor shall provide all tools, equipment and services required for satisfactory installation per manufacturer's instruction as Incidental Work. Equipment, which may be required include typical mason's tools, a 2-foot long level with electronic slope readout, (2) 25-pound weights, and a rubber mallet with a piece of wood for tamping down the Tactile Warning Unit(s).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that pavement is in suitable condition to begin installation according to manufacturer's written instructions. Verify that installation of tactile warning surfacing will comply with accessibility requirements upon completion.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF TACTILE WARNING SURFACING

A. Contractor will not be allowed to install Tactile Warning Surface Tiles until all submittals have been reviewed and approved by the Engineer.

B. REP Tile shall be installed per manufacturer's instructions.

C. To the maximum extent possible, the REP Tiles shall be oriented such that the rows of in-line truncated domes are parallel with the direction of the ramp. When multiple REP Tiles regardless of size are used, the truncated domes shall be aligned between the

tactile warning surface tiles and throughout the entire tactile warning surface installation.

D. In accordance with the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Rights of Way (7/23/11, Access Board): Sections 304 + 305), Tactile Warning Surface Tile shall be located relative to the curb line as shown within Sections 304+305 of the Guidelines.

E. The REP Tiles shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the Tactile Warning Surface Tile is flush to the adjacent concrete surface or as the Drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.

F. On Continuous Runs: The Installer shall leave a 1/8" nominal gap between successive Tactile Warning Surface Tiles. As part of the concrete finishing operation, the Installer shall apply ¼" edge treatment around the perimeter of the Tactile Warning Surface Tiles to facilitate future replacement of the Tactile Warning Surface Tile. A Urethane Sealant such as Sikaflex 1a or BASF NP1 shall be applied to the edge treatment for a watertight Tactile Warning Surface Tile installation.

G. The manufacturer recommends that a maximum of 30 feet be installed in any single pour. Please call (800) 372-0519 for further details.

3.3 CLEANING AND PROTECTION

A. Protect tactile warning surfacing from damage and maintain free of stains, discoloration, dirt, and other foreign material. Protect REP Tiles against damage during construction period to comply with REP Tiles manufacturer's Specifications.

B. During and after the REP Tile installation and the concrete curing stage, it is imperative that there are no walking, leaning or external forces placed on the REP Tile to rock the REP Tile, causing a void between the underside of the REP Tile and the concrete substrate.

C. Remove Protective Plastic Sheeting from REP Tile within 24 hours of installation of the REP Tile. Particularly under hot weather conditions (80 degrees or higher), plastic sheeting will adhere strongly (resulting in difficult removal of same) to Tactile Warning Surface Tile when not removed quickly.

D. If requested by the Project Manager, clean REP Tiles not more than four (4) days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean REP Tile by method specified by Tactile Warning Surface Products manufacturer.

END OF SECTION 32 17 26

SECTION 321814 SYNTHETIC GRASS TURF SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes synthetic grass turf system.

1.2 REFERENCES

A. ASTM International:
1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension.
2. ASTM D418 - Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials.
3. ASTM D1335 - Standard Test Method for Tuft Bind of Pile Yarn Floor Coverings.
4. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 kN-m/m3)).
5. ASTM D1682 - Standard Practice for Rehabilitation of Existing Pipelines and Conduits by the Pulled in Place Installation of Glass Reinforced Plastic (GRP) Cured-in-Place Thermosetting Resin Pipe (CIPP).
6. ASTM D2256 - Standard Test Method for Tensile Properties of Yarns by the Single-Strand Method.
7. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials.
8. ASTM D5034 - Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test).
9. ASTM F36 - Standard Test Method for Compressibility and Recovery of Gasket Materials.
10. ASTM F355 - Standard Test Method for Shock-Absorbing Properties of Playing Surface Systems and Materials.
11. ASTM F1335 - Standard Specification for Pressure-Rated Composite Pipe and Fittings for Elevated Temperature Service.
12. ASTM F1551-03 - Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials.

B. Pennsylvania Interscholastic Athletic Association (PIAA).

C. National Federation of State High School Association (NFHS).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Substitutions: Other products are acceptable if in compliance with all requirements of these specifications. Submit alternate “or equal” products to Professional for approval prior to bidding in accordance Section 01 25 00, Product Substitution Procedures.

1. Provide substantiation that proposed system does not violate any other manufacturer's patents, patents allowed or patents pending.
2. Provide a sample copy of insured, non-prorated warranty and insurance policy information.
3. Comply with Section 01 33 00, Submittals Procedures. Submit for approval prior to fabrication.

C. Product Data: Submit manufacturer's literature, including the following:
1. Submit product information for all materials required under this Section including third party ASTM certified lab reports.
2. Submit chemical content list of turf fiber and backing materials, and a description of how fibers are made to be UV resistant.
3. Sample Warranties:
   a. Manufacturer's written warranties for all individual components of the Infilled Synthetic Turf System.

D. Shop Drawings:
1. Shop drawings shall be prepared at the scale of the Construction Documents and contain all pertinent information regarding installation.
2. These drawings shall be submitted to the Owner for approval prior to the manufacturing and shipment of materials.
3. Submit drawings for:
   a. Seaming plan.
   b. Installation details; edge detail, other inserts and covers, etc.
   c. Striping plan; layouts showing all field lines, markings and boundaries, and field graphics shall be provided.
   d. Construction and manufacturer's details that may deviate from the Contract Document; deviations must be justified in writing by the manufacturer.

E. Samples:
1. Submit a 1-pint sample of the infill material at the approved ratio.
2. Submit one 24 inch x 24 inch sample of selected turf product, which contains a 4 inch tufted white line and a 4 inch white line inlaid through the middle to depict materials, colors and workmanship.
3. Submit additional yarn samples showing colors other than green, required under these specifications, as needed and requested.
4. Submit a 12 inch sample of seaming tape for inlays.
5. Selection Samples:
   a. Submit standard selection of fonts for letters for field graphics for Owner selection.
   b. Submit list of standard colors available for synthetic turf.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
1. Submit a signed statement from the Contractor and Infilled Synthetic Turf System Manufacturer that the Drawings and Specifications have been reviewed by a qualified representative of the Infilled Synthetic Turf System Manufacturer and major materials suppliers, and that they are in agreement

that the materials and installation method to be used for the Infilled Synthetic Turf System are proper and adequate for use as a High School multi-purpose athletic field in the Commonwealth of Pennsylvania

G. Test and Evaluation Reports:
1. Submit certified copies of independent (third-party) laboratory reports on ASTM tests as follows:
a. ASTM D5848 - Pile height, face weight and total fabric weight.
b. ASTM D5848 - Primary and Secondary Backing Weights.
c. ASTM D1335 - Tuft Bind.
d. ASTM D1682 - Grab Tear Strength.
e. ASTM F355 - Dynamic Cushion Test Procedure A (system).
f. ASTM F1551 – Water Permeability

H. Submit quality assurance requirements including documentation of manufacturer and installer qualifications.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for closeout submittals.

B. Record actual locations of ground sleeves, electrical conduits, plumbing connections, and other underground or concealed utilities and structures.

C. Submit Bills of Lading/Material Delivery Receipts for synthetic turf infill materials. Bills of lading shall bear the name of the project/delivery address, quantity of materials delivered, source/location of origin of infill materials and/or manufacturer, and date of delivery.

D. Prior to Final Acceptance, the Contractor shall submit to the Owner Maintenance Manuals, including instructions for the proper care and preventative maintenance of the synthetic turf system, including painting, striping and cleaning.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum ten years' experience.
1. The synthetic turf manufacturer shall have the experience of at least five acceptable installations of full-size baseball or softball fields in the United States within the past three years of tufted, slit film polyethylene grass-like fabric. These installations shall have been infilled with a system of rubber and/or rubber with sand.
2. The manufacturer must have ISO 9001, ISO 14001 and ISO 45001 certifications demonstrating its manufacturing efficiency with regards to quality, environment and safety management systems.

B. Installer: Company specializing in performing Work of this Section with minimum five years documented experience and approved by manufacturer.

1. The synthetic turf installer shall have the experience of at least five acceptable installations of full-size baseball or softball fields in the United States within the past three years of tufted, slit film polyethylene and monofilament grass-like fabric. These installations shall have been infilled with a system of rubber and/or rubber with sand.
2. The turf installer shall employ only qualified, experienced supervisors and technicians skilled in the installation of the specified system.
   a. Submit resumes of installation supervisor and key installation personnel.
3. Turf installers must be directly employed by the Infilled Synthetic Turf System Manufacturer. Subcontractors will not be accepted for the installation with the Infilled Synthetic Turf System.

C. Contractor:
1. Contractor must include name of facility, address, date work completed, contact name and telephone number.
2. Have proper license, in good standing, and have never had a license revoked.
3. Are able to substantiate currently available bonding capacity in excess of $2,000,000 per project and an aggregate bonding line in excess of $10,000,000.
4. Have not had a Surety or Bonding Company finish work on any contract within the last five (5) years.
5. Have not been disqualified or barred from performing work for any public owner or other contracting entity.
6. Shall have demonstrable financial strength to fully service and warrant the system installed by providing upon request, an audited financial statement for the past year.

1.6 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
1. Furnish Manufacturer's Warranty guaranteeing the usability and playability of the synthetic turf system for its intended uses for a ten-year period commencing with the date of Substantial Completion. The warranty coverage shall not be limited to the amount of usage.

B. Warranty Requirements:
1. Provide full coverage for **ten years** from the date of Substantial Completion.
2. Warrant materials and workmanship, including without limitation such defects as premature decrease in pile height or weight (stipulated as more than 10 percent decrease in pile), UV degradation, fading, seam rupture, dislodgement or inadequate drainage, damage by climatic conditions or proper and normal use, including the use of cleats.
3. Warrant that the materials installed meet or exceed the product specifications.
4. Contain a provision to either make a cash refund or repair or replace such portions of the installed materials that are no longer serviceable to maintain a serviceable and playable surface.

5. Manufacturer's warranty from a single source covering workmanship and all self-manufactured or procured materials.
6. Guarantee the availability of replacement materials for the synthetic turf system installed for the full warranty period.
7. Clearly state that if test results show that Gmax rating has not been met, the manufacturer will repair or replace product within the warranty period as necessary to meet those requirements at no cost to the Owner.

1.7 PROJECT CONDITIONS

A. The new synthetic turf system is to be placed on a new base of porous aggregate. The synthetic turf installer will be responsible for any damage to the subbase during installation of the synthetic turf system after the deficiencies (if any) have been corrected as noted on the Certificate of Subbase Acceptability.

B. Field Measurements: Verify field measurements prior to fabrication. Indicate field measurements on Shop Drawings.

C. Utilities: Provide water, lighting and electricity required for installation in accordance with Section 01 50 00 - Temporary Facilities and Controls.

D. The Work of this Section requires high flotation, low ground pressure equipment. Equipment shall be as light in weight as physically possible to perform the Work in a timely manner.

1.8 MAINTENANCE

A. Repair Materials:
1. Upon Substantial Completion, provide directly to Owner the following items in the minimum quantities specified:
   a. Seaming Tape: 200 linear feet.
   b. Seaming Epoxy: Sufficient quantity for 50 square feet.
   c. Turf Fabric (Green): - 250 square feet with at least one piece 15 feet wide X 10 feet long.
   d. 4 inch-wide Colored Fabric: Minimum 100 linear feet of each color specified for inlaid line striping.
   e. Minimum 5 feet x 5 feet piece of every color used in any logos or graphics.
   f. 500 pounds of approved infill mix in weatherproof bags.

B. Contractor shall train the Owner's facility maintenance staff in the use of the turf manufacturer's recommended maintenance equipment.

1.9 PATENT RIGHTS AND INFRINGEMENT

A. There are various established performance criteria throughout this request for products and services. There may exist patent coverage for some means and methods of achieving those performance criteria. Bidders are responsible for ascertaining that means and methods of the products and services which they are

providing are not being provided in violation of any such patent rights. Bidders responsibilities are as follows:

1. To hold harmless, the Owner and all Project Consultants, as to any violation to include dollar amounts that could be owed as a result of damages for infringement including potential treble damages as provided for under U.S. Patent Law.
2. Any and all costs that the Owner and all Project Consultants would incur in replacing materials and services which are determined to infringe patent rights.
3. All administrative, legal and other costs that would be incurred as a result of an infringement.
4. If any product or services proposed to be provided by the bidder are known by the bidder to be subject to any existing claims of infringement, bidder shall notify Owner and Engineer of such claim and provide evidence of financial ability to perform on the above hold harmless requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Shall be a tufted, polyethylene grass-like fabric coated with a secondary backing of high-grade polyurethane. The product shall be a **combination of slit-film and monofilament fibers** and tufted to a finished pile height of approximately 2-1/4 inches high. The turf fabric shall be filled with rubber/sand particles..

B. All components and their installation method shall be designed and manufactured for use on outdoor athletic fields. The materials, as hereinafter specified, should be able to withstand full climatic exposure in Franklin County, Pennsylvania, be resistant to insect infestation, rot, fungus and mildew; to ultra-violet light and heat degradation, and shall have the basic characteristic of flow through-drainage allowing free movement of surface run-off through the turf fabric where such water may flow to the existing subbase and into the field drainage system.

C. The Infilled Synthetic Turf System shall provide a high quality multi-purpose athletic surface similar to natural grass that is immediately firm, consistent and stable while providing long term durability, safety and shock attenuation. The finished surface shall resist abrasion and cutting from normal use. The installed system shall be ideal for football, soccer, field hockey, PE classes, intramurals and recreational use.

D. Polyethylene pile yarn shall be a proven athletic caliber yarn designed specifically for outdoor use and stabilized to resist the effect of ultraviolet degradation, heat, foot traffic, water and airborne pollutants.
   1. Color: Refer to Drawings for colors.
   2. Furnish and install multi-purpose Infilled Synthetic Turf Systems. Acceptable Infilled Synthetic Turf Contractors/Vendors are limited to the following:
      a. FieldTurf, West Chester, PA, Phone: 484-432-9380.
      b. A-Turf, Cheektowago, NY, Phone: 800-777-6910.
      c. AstroTurf, Pittsburgh, PA, Phone: 267-872-0589
      d. Shaw Sports Turf, Freehold, NJ, Phone: 609-977-3961

e. Sprinturf, Lancaster, PA Phone: 717-917-1790
f. Tencate TigerTurf. Dayton, TN, Phone: 800-251-1033
g. Approved Equal

2.2 INFILLED SYNTHETIC TURF SYSTEMS

A. The Pile fabric shall possess the following physical characteristics:
1. Hybrid system of slit-film and monofilament fibers
2. Finished Pile Height: Per ASTM D418, Two and one-quarter (2 1/4) inches
3. Pile Yarn Weight: as determined by the manufacturer for the specified products.
4. Stitch Rate: Minimum 10 stitches per 3 inches per ASTM D418.
5. Tufting Gauge: 3/8 – 1/2 inch gauge per ASTM D418.
6. Thickness: Minimum 100 microns per ASTM D418.
7. Face weight: Minimum 41 ounces per square foot
8. Primary Backings: 6 ounces/square yard.
   a. Woven Polypropylene.
   b. Non-woven polypropylene with fiberglass reinforcement.
9. Secondary Elastomeric Coating: Minimum 20 ounce/square yard.
10. Fabric Width: 15 feet.
11. Tuft Bind Strength: Minimum 7 pounds/foot without fill per ASTM D1335/F1551.
12. Grab Tear Strength: Greater than 240 pounds per ASTM D5034.
13. Flammability (Pill Burn Test): Pass (with infill) per ASTM D2859.

B. Infill material shall be a layering of ground SBR rubber granules and rounded silica sand. Angular or subangular sand will not be accepted. The rubber granules should be ambient or cryogenically processed rubber containing no dust or contaminants. The sand to rubber weight ratio shall be as noted or as recommended by the manufacturer to meet testing and performance requirements. The infill materials shall meet the below listed sieve analyses:

GROUND SBR RUBBER

U.S Mesh	% Retained
12	0
14	1 - 10
16	10 - 30
20	40 - 80
30	80-95
40 - 50	100

SILICA SAND

U.S. Mesh	Metric (mm)	% Retained
20	0.85	0-3
30	0.590	30 - 50
40	0.420	50 - 60
50	0.297	<5
70	0.210	Trace

C. Backing:
1. Turf backing shall consist of a primary backing of woven polypropylene and non-woven polypropylene with fiberglass reinforcement.
2. Backing shall be entirely coated with a secondary elastomeric coating of high-grade urethane. Drainage holes shall be perforated in the factory and spaced per manufacturer's recommendation. Latex coatings will not be accepted.

D. Shock Absorbency:

1. Shock Impact Attenuation and ball response characteristics are important elements for athletic activities. The synthetic turf contractor shall periodically test the installed field for Gmax to assure proper performance as well as Owner's maintenance. This must be performed by an approved and certified independent testing laboratory.
   a. Testing shall consist of shock attenuation per ASTM F355, Procedure A.
   b. At no time during the warranty period shall the Gmax exceed 165; or to be less than 90, at any location on the field, assuming Owner's maintenance personnel follow the procedures outlined in the furnished Owner's Manual.
   c. Contractor shall have the surface tested for Gmax per ASTM F355, at its own expense, one month after installation and at the end of the anniversary dates of the first, third, fifth and seventh years, and 60 days prior to the anniversary date of the project warranty expiration.
   d. The Owner and Engineer shall be provided with copies of all testing reports.
   e. Testing shall be performed at the field's center, the goal locations for all sports and at 10 yards inside each corner for all sports. Tests shall also be taken at 4 random spots as chosen by the Owner or Engineer.
   f. In cases where the result of a test falls outside the specified values, additional tests shall be taken in 10 foot increments in 4 opposite directions (north, south, east and west) from the failing test point and each subsequent failing test point until all tests fall within the specified values. The failing area shall be marked off, repaired and retested by the Infilled Synthetic Turf System Manufacturer until all tests fall within the specified values.
   g. If any tests fall within 5 percent of the maximum specified value, the Owner, at his discretion may require one additional set of tests at any time during the calendar year to be paid for by the Infilled Synthetic Turf System Manufacturer.
2. HIC
   a. The General Contractor shall provide the necessary testing data to the Owner, verifying that the finished field meets the required hemisphere impact attenuation (HIC), as per ASTM F1292. Immediately upon substantial completion, the General Contractor shall arrange for HIC testing by a certified laboratory subject to approval by Designer. Testing will be performed at a minimum of ten locations selected by the Designer "In-House" laboratories with a business affiliation to the turf manufacturer and/or installer are unacceptable.
   b. The HIC value at installation shall be below 1,000 at 1.3m for each location tested.
   c. Over the life of the guarantee, the synthetic turf manufacturer/installer shall arrange and pay for annual re-testing of the field using the same procedure if requested by the Owner. The synthetic turf manufacturer/installer shall take whatever action is required to remedy any HIC value greater than 1,000. These costs will be included in the turf unit price proposal. Over the life of the warranty, changes in HIC values greater that 1,000 shall be remedied by the synthetic turf manufacturer/installer within 30-days of the deficient test result.
3. Vertical Deformation (AAA):
   a. The General Contractor shall provide the necessary testing to the Owner, verifying that the finished field meets the required vertical deformation test using the Advanced Artificial Athlete (AAA) method. Immediately upon substantial completion, the General Contractor shall arrange for testing by a certified laboratory subject to approval by the Designer. Testing will be performed at a

minimum of ten locations. “In-House” laboratories with a business affiliation to the turf manufacturer and/or installer are unacceptable.

b. The vertical deformation value at installation shall be between 5mm and 10mm.

F. Perimeter and interior edge details required for the system shall be as detailed and recommended by the manufacturer, and as approved by the Engineer.

2.3 MAINTENANCE EQUIPMENT

A. Provide one (1) combination field groomer/ cleaner for routinely brushing the field and removing debris. It shall be a ground-driven tow-behind unit equivalent to “TurfCare TCA 1400” as manufactured by SMG Machines Corporation, 1615 Environs Lane, Dalton, GA 30720, Phone: (762) 226-1424, or equal as approved by Engineer.

B. Provide one (1) tow-behind magnet bar for metal removal from the turf surface, equivalent to Magnet Bar Model ML1500 as manufactured by SMG Machines Corporation, 1615 Environs Lane, Dalton, GA 30720, Phone: (762) 226-1424, or equal as approved by Engineer.

C. Alternate grooming equipment may be provided by the turf manufacturer to comply with specific warranty requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.

B. Prior to the beginning of installation, the manufacturer/installer of the synthetic turf shall inspect the subbase and supply a Certificate of Subbase Acceptance for the purpose of obtaining manufacturer’s warranty for the finished synthetic playing surface.

C. The surface to receive the synthetic turf shall be inspected and certified by the turf manufacturer as ready for the installation of the synthetic turf system and must be clean as installation commences and shall be maintained in that condition throughout the process.

D. Compaction of the aggregate base shall be 95%, in accordance with ASTM D1557 (Modified Proctor procedure); and the surface tolerance shall not exceed 0-1/4 inch over 10 feet and 0-½" from design grade.

3.2 PREPARATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.

B. Provide an As-Built Layout Drawing prior to infilling with verification and certification that field layouts meet the specified requirements.

C. Dimensions of the field and locations for markings shall be measured by a registered surveyor to verify conformity to the specifications and applicable standards. A record of the finished field as-built measurements shall be made.

D. When requested by Professional, installed sub-base shall be tested for porosity prior to the installation of the turf. A subbase that drains poorly is an unacceptable substrate.

3.3 INSTALLATION

A. Only factory-trained technicians, skilled in the installation of athletic caliber synthetic turf systems working under the direct supervision of the synthetic turf manufacturer's installation supervisors shall undertake the placement of the system.

B. The installation shall be performed in full compliance with approved shop drawings.

C. The Contractor shall thoroughly inspect all materials delivered to the site both for quality and quantity to assure that the entire installation shall have sufficient materials to maintain the schedule and proper mixing ratios.

D. Synthetic turf shall be loose-laid across the field, stretched, and attached to the perimeter edge detail. Turf shall be of sufficient length to permit full cross-field installation. No head or cross seams will be allowed, except as required for inlaid fabric striping or to accommodate programmed cutouts.

E. Seams of turf shall be sewn with high strength chord. All seams shall be flat, tight, and permanent with no separation or fraying. Inlaid markings shall be adhered to a special tape with a two-part, high strength polyurethane adhesive applied per the Manufacturer's standard procedures for outdoor applications.

F. Infill material shall be properly applied in numerous thin lifts using special broadcasting equipment to produce a layered system of rubber and sand. The turf shall be raked and brushed properly as the infill is applied. The infill material shall be installed to a depth determined by the manufacturer after settlement in order to achieve specified Gmax requirements. The infill materials can only be applied when the turf fabric is bone dry.

3.4 FIELD MARKINGS

A. Contractor shall verify all dimensions.

B. The contractor shall provide a striping plan at the same scale of the construction documents which demonstrates compliance with PIAA and NFHS requirements for the following layouts. The striping plan shall indicate all tufted and inlaid field markings.
   1. Lines for Football (White)
   2. Lines for Soccer (Yellow)
   3. Lines for Field Hockey (Maroon)
   4. Custom logos (As required)

C. High resolution images shall be provided by the owner for the field and logos as specified. Colors shall match owner requirements.

3.5 DEMONSTRATION

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Provide field maintenance training and a comprehensive written Field Maintenance manual to the Owner.

3.6 CLEANING

A. Turf installer shall provide the labor, supplies and equipment as necessary for final cleaning of surfaces and installed items.

B. All usable remnants of new material shall become the property of the Owner.

C. Turf installer shall keep the area clean throughout the project and clear of debris.

D. Surfaces, recesses, enclosures, etc., shall be cleaned, as necessary, to leave the work area in a clean condition ready for use by the Owner.

3.7 MAINTENANCE (POST-CONSTRUCTION FOLLOW-UP VISITS)

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance service.

B. The synthetic turf manufacturer shall provide two follow-up visits at six-month intervals after the final inspection date.

C. The visit shall be scheduled to inspect the condition of the synthetic turf, infill material, drainage system and peripheral attachments. Seams found to require repair, amendment, or replacement shall be the responsibility of the Contractor. Repairs, except those due to vandalism, shall take place immediately.

END OF SECTION 32 18 14

SECTION 32 18 33 - SYNTHETIC TRACK SURFACING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.

1.2 SPECIFIC SCOPE OF WORK

A. Install an impermeable polyurethane synthetic track system comprised of a base layer of polyurethane bound SBR rubber granules, an impermeable layer (seal coat) of a two-component urethane, and topped with a spray-applied coating of single-component polyurethane, and EPDM granules.

B. Layout and paint all track lines and event markings, as required and specified by current NFHS & PIAA rules.

1.3 RELATED SECTIONS

A. Examine the Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
   1. Section 312000 – Earth Moving
   2. Section 321123 - Aggregate Base Course
   3. Section 231216 – Asphalt Paving
   4. Section 321837 – Track Line - Marking

1.4 REFERENCES

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.
   1. American Association of State Highway and Transportation Officials (AASHTO):
   2. American Society for Testing and Materials (ASTM):
   3. NFHS – National Federation of State High School Athletic Associations
   4. PIAA – Pennsylvania Interscholastic Athletic Association
   5. ASBA – American Sports Builders Association Running Tracks: A Construction and Maintenance Manual
   6. PENNDOT Publication 408 as amended (Latest Edition).

B. Codes and standards follow the current guidelines set forth by the National Federation

of High School Athletic Associations (NFHS) and the Pennsylvania Interscholastic Athletic Association (PIAA), along with the current material testing guidelines as published by the American Society of Testing and Materials (ASTM), and the American Sports Builders Association (ASBA) Track Construction Manual.

1.5 SITE CONDITIONS

A. The synthetic surfacing contractor shall coordinate the work specified with an authorized and appointed representative of the Owner so as to perform the work during a period and in a manner acceptable to the Owner.

B. The curing time for the asphalt base shall be a minimum of 28 days. Resilient surfacing shall not be installed prior to specified asphalt cure period, unless previously approved in writing by the engineer. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of the polyurethane surfacing system.

C. Resilient surfacing or binders shall not be installed unless the temperature is fifty degrees Fahrenheit and rising. Installation shall be executed only in fully dry conditions.

1.6 SYNTHETIC TRACK SURFACE INSTALLER QUALIFICATIONS

A. The synthetic track surface installer shall have a minimum of 5 years of experience of successfully installing basemat/structural spray running tracks and shall have installed a minimum of 8 complete polyurethane running track surfacing systems, including those requiring a structural spray in Pennsylvania within the past 5 years. **Asphalt paving subcontractor shall have an equal level of experience with running track base installations as the track surface installer, as provided above.**

B. The synthetic track surface installer shall be able to furnish evidence that they have been in business for a period of not less than 5 years, under the present name and, if required, furnish financial statements for each of the past three (3) years.

C. The synthetic track surface installer must be a member of the American Sports Builders Association (ASBA), and must employ a Certified Track Builder (CTB), as approved by ASBA, who will supervise the surface installation.

D. The synthetic track surfacing manufacturer shall provide evidence indicating that the specified materials have been successfully utilized on work of similar scope to that shown and specified for this Project. The synthetic track surfacing examples cited shall have been completed and in use for five years, without any evidence of failure.

E. Synthetic track surface manufacturer shall provide certification that all materials utilized are designated as “mercury and heavy-metals-free”.

F. Synthetic surfacing work shall be done only after excavation and construction work, which might damage the new surface, has been completed. Damage caused during construction shall be repaired to the Owner’s full satisfaction before acceptance.

G. Existing areas shall, if damaged or removed during the construction of this project, be

repaired or replaced at no extra cost to the Owner. Workmanship and materials for such repair and/or replacement, unless otherwise noted, shall match as closely as possible to those employed in the existing work.

H. The synthetic surfacing contractor shall take precautionary measures to prevent track surfacing material from staining or coating other surfaces. Staining and coating damage shall be cleaned, removed or repaired to original condition by the synthetic surfacing contractor, to the Owner's full satisfaction.

I. Thickness of the finished system shall be one half inch (1/2"). Thickness value shall not be determined to the very top of the surface crumb or texture, but to a point somewhat below that, as laid down in a precise method of test.

1.7 SUBMITTALS

The following submittals must be received with bid submittal:

A. Standard printed specifications of the resilient track surfacing system, or its equal, to be installed on this project.

B. An affidavit attesting that the resilient track surfacing system to be installed meets the requirements defined by the manufacturer's currently published specifications and any modifications outlined in those technical specifications.

C. Synthetic track surfacing system samples, 4" x 4" in size, of the same synthetic track surfacing system to be installed on this project, in each color to be used.

D. An installation list of outdoor track facilities installed by the designated installer in the last two (2) years, using the exact synthetic track surfacing system specified herein.

E. An installation list of outdoor running track facilities installed by the asphalt paving subcontractor in the last two (2) years.

F. Other materials and certifications as called out in section 3.1

G. After completion of the work of this Section, a licensed professional engineer, registered land surveyor or (ASBA) certified track builder shall furnish an acceptable certificate of accuracy of all track markings and measurements. The certificate of accuracy shall include the post-construction surveyed length of the track as measured at the measurement line for each of the running lanes. The lanes shall measure between 400.000m minimum to 400.080m maximum per ASBA Class 4 running track requirements.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unopened packages with manufacturer's labels intact and clearly identifying products.

B. Store materials elevated above grade and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, construction traffic and other causes.

C. Comply with procedures recommended by the manufacturer.

1.9 GUARANTEE

A. The Track Surfacing System shall be fully guaranteed against faulty workmanship and material failure for a period of five (5) years from the date of acceptance. The warranty coverage shall not be prorated, nor limited by the amount of usage. It shall cover (but not be limited to) exercise wear, fading, blistering and delamination.

B. Synthetic surfacing material found to be defective as a result of faulty workmanship and/or material failure shall be replaced or repaired, to the Owner's full satisfaction and at no charge, upon written notification within the guarantee period.

PART 2 – MATERIALS

2.1 ASPHALT TRACK PAVING

A. **Asphalt for track surface paving shall comply with the requirements of specification section 32 12 16 Asphalt Paving except for the following:**

Bituminous Design mix for Track Pavements:

- **RAP – Recycled Asphalt content shall NOT be used in the design mix.**
- **RAS – Recycled Asphalt Shingles shall NOT be used in design mix.**
- **The Performance Grade (PG) of asphalt binder used in the design mix shall be tailored specifically for the climate/environmental conditions of the proposed project's geographic location and ability to resist thermal cracking at low temperatures. Contractor to submit documentation of examples where similar PG design mixes were used for running track construction projects in the same regional area.**

B. Grading tolerances for the Asphalt running track are included as noted in Part 3 of this specification section.

2.2 RESILIENT TRACK SURFACING

A. Resilient track surfacing shall be a paved in place, ½" thick synthetic, impermeable polyurethane system intended for use on competitive running tracks, comprised of a base layer of polyurethane-bound SBR granules and topped with a single-component polyurethane structural spray, and EPDM granules.

B. Acceptable surfacing system shall be:

1. BSS-200 Track Surfacing System as manufactured by Beynon Sports.
2. Rekortan BSS Track Surfacing System as manufactured by Rekortan
3. Approved equal.

C. The installed resilient track surfacing system shall exhibit the following minimum

performance standards (ASTM):

- Thickness: ½" (13mm) or as specified
- Shore A Hardness: 55 ± 5 (ASTM D-2240)
- Elongation at Break: ~90% (ASTM D-412)
- Tensile Strength: 0.75 N/mm2 (ASTM D-412)
- Compression Set Recovery: ~90%-95% over 24 hr period (ASTM D-412)
- Abrasion Resistance: 0.25 grams loss after 1000 cycles (ASTM D-501)
- Coefficient of Friction Dry: 0.7-0.75, Wet: 0.6-0.65 (ASTM D-1984)
- Resilience: 37%-39% (ASTM D-2632)
- Tear Resistance: 50-65 psi (ASTM D-624)
- Color Two-color, as shown on plan

2.3 PRIMERS

A. Primers must be polyurethane-based, specifically formulated to be compatible with the paved SBR base and track surfacing material.

2.4 BLACK SBR GRANULES

A. The rubber granules for the base mat shall be recycled SBR rubber, processed and chopped to 1-3mm size, containing less than 1% dust, and no metals.

2.5 EPDM GRANULES

A. The rubber granules for the structural spray, or equal, wearing coats shall be EPDM, peroxide-cured, synthetic rubber, containing a minimum 20% EPDM resin, with a specific gravity of 1.5 ±0.1 g/cm3. The EPDM rubber shall be the same color chosen by the Owner for the track surface.

2.6 POLYURETHANE BINDER

A. Binder for the black mat shall be an MDI-based single-component, polyurethane binding agent. The binder shall not have a free TDI monomer level above 0.2%, and must be solvent free. The binder must be specially formulated for compatibility with SBR rubber crumb.

2.7 STRUCTURAL SPRAY COATING

A. The spray coating shall be an MDI-based single-component, moisture cured, 100% solids, pigmented polyurethane, specifically formulated for compatibility with EPDM granules. The coating shall be the color specified by the Owner. Pigment integrated in the field shall not be allowed.

2.7 SEAL COAT

A. The two-component polyurethane resin for this application, shall be pigmented to match the color of the wear coat. The material shall be applied by a squeegee to insure that the black mat is sealed.

2.9 LINE MARKING PAINT

A. All line and event markings shall be applied by experienced personnel, utilizing a single component, moisture cured, aliphatic polyurethane paint compatible with the resilient track surfacing system material.

PART 3 – EXECUTION

3.1 RUNNING TRACK BASE

A. The Resilient track surface shall be laid on an approved subbase and a bituminous asphalt mat, a minimum of three inches (3") in thickness. The General Contractor shall provide compaction test results of 95% or greater for the installed subbase and asphalt surface.

B. Special care shall be taken during the paving process to insure smooth and imperceptible joints, blending asphalt uniformly to achieve a continuous surface. Infra-red heating devices shall be employed when temperature of material in place falls below 150d F.

C. The track surface, i.e., asphalt substrate, shall not vary under a 10' straight edge more than 1/8".

D. It is the responsibility of the asphalt-paving contractor to flood the surface with water immediately after the asphalt is capable of handling traffic, and within 24 hours of installation. If, after 20 minutes of drying time, there are birdbaths (depressions deeper than 1/8") evident, it shall be the responsibility of the General Contractor, in conjunction with the surfacing contractor to determine the method of correction, subject to the engineers approval. Cold tar patching, skin patching or sand mix patching IS NOT an acceptable means of correction.

E. Any oil spills (hydraulic, diesel, motor oil, etc.) shall be completely removed, either by chipping out or removing and replacing with new, keyed in asphalt. The minimum depth of any asphalt replacement shall be one inch. The curing time for the asphalt base is 28 days. It shall be the responsibility of the surfacing contractor to determine if the asphalt substrate has cured sufficiently prior to the application of the polyurethane surfacing system.

F. It shall be the responsibility of the general contractor to determine if the asphalt substrate meets all design specifications; i.e., cross slopes, planarity and specific project criteria. After all the above conditions are met, the synthetic surfacing contractor must, in writing, accept the planarity of the asphalt receiving base before installation of the resilient surfacing can commence.

G. Start of synthetic track surface application shall constitute sub contractor's acceptance of the asphaltic concrete surface to receive synthetic track surfacing.

3.2 SITE CONDITIONS

A. Installation shall not take place if adjacent or concurrent construction generates excessive dust, abrasives or any other by-product that, in the opinion of the installer, would be harmful to the track material, until completion of such works.

B. Installation shall not occur if wind conditions will cause blowing or migration of over-spray off site, or potentially damage adjacent features. The contractor is responsible for any damage on or off-site directly related to the migration of overspray of the resilient track surfacing.

C. Resilient surfacing or binders shall not be installed unless the temperature is fifty degrees Fahrenheit and rising. Installation shall be executed only in fully dry conditions.

D. If, in the opinion of the installer of the synthetic material, the weather and/or climatic conditions are detrimental to the proper installation of the surfacing materials, work shall be delayed until conditions are acceptable.

3.3 EQUIPMENT

A. The resilient track surfacing components shall be processed and installed by specially designed machinery and equipment as manufactured by SMG or equal. A mechanically operated paver, with variable regulated speed and thermostatically controlled screed, shall be used in the installation of the base mat, utilizing continuous and computerized mixing. The wearing course shall be installed using automatic electronic portioning, which provides continuous mixing and feeding for an accurate, quality-controlled installation.

3.4 INSTALLATION

A. Resilient Base Course: The SBR granules and binders shall be mixed together on site to regulate the ratio/quantity of SBR, not to exceed 82% in the base mat portion of the system. The single component polyurethane binder shall be mixed with the SBR rubber so that a minimum of 20%, by weight, exists in the final mixture. This mixture is then mechanically installed using the paver machine.

B. Seal Coat: The two components are mixed at the prescribed ratio homogeneously with a suitable mixing device. The coating is squeegee applied to the base mat, making it impermeable.

C. Resilient Wearing Course: The 0.5 to 1.5 millimeter EPDM granules shall be mixed with the single-component structural spray coating. The structural spray shall be made in two (2) uniform applications.

3.5 TRACK STRIPING

A. Line and event markings shall be applied by experienced personnel utilizing Acrylic based paint compatible with the synthetic track surfacing. All marking dimensions shall be certified in accordance with the specifications issued and by Section 32 1837 Track Line-Marking.

B. Provide adequate barricades or other protective methods in order to prevent traffic over newly painted areas.

END OF SECTION 32 18 33

SECTION 321837 - TRACK LINE-MARKING

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS (PCR), which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION

A. This section pertains to the application of all line marking on the resilient running track surface. The Contractor shall provide all track event marking required by the American Sports Builder's Association (ASBA), National Federation of High School Standards (NFHS), and Pennsylvania Interscholastic Athletic Association (PIAA).

1.3 RELATED SECTIONS

A. Examine the Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:

1. Section 32 18 33 – Resilient Track Surfacing

1.4 QUALITY CONTROL

A. Submittals: The Contractor will prepare and submit for approval a colored track striping and marking plan shop drawing indicating all lane and event markings for approval prior to commencing this phase of the work.

B. Provide specific manufacturers product data for all types of paints and overlays to be used in running track lane marking.

C. The Contractor will prepare and submit for approval a colored track striping and marking plan shop drawing indicating all lane and event markings for approval prior to commencing this phase of the work.

D. The Contractor is responsible for the removal or correction of any overspray, spill or marking not in compliance with applicable track layout.

PART 2 – MATERIALS

2.1 PRODUCTS

A. 100% Acrylic Line paint (Plexicolor, as manufactured by California Products, or approved equal). Line marking paint shall be as approved and recommended by the approved resilient track surfacing manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Prior to performing any striping work, the striping contractor shall meet with the Owner and the Engineer/Landscape Architect to discuss and approve the striping layout.

B. The Contractor shall provide all labor, materials and equipment necessary to perform the following:

1. Locate and establish radius points.
2. Establish and set all necessary control points.
3. Lay out all lines and marking to within a one-half inch (1/2”) (plus only) tolerance according to the markings layout shown on the plans.
4. Prepare all necessary shop drawings.
5. Provide all computations and measurements in organized form.
6. Establish all locations on the curves.
7. Identify all markings, where appropriate, by painting the identification directly onto the track surface in four (4)” letters just below or in front of each mark in the right hand portion of the lane.
8. Paint all of the large three (3) foot high lane numbers in two (2) colors (shadowed backgrounds). Colors to be determined by Owner upon awarding of Contract.
9. All lines shall receive sufficient paint to assure complete opacity and uniformity of color.
10. Paints shall be used directly from original containers and thinned according to the manufacturers written instructions.
11. Paint application rate shall be as recommended by manufacturer.
12. All measurements shall be made by competent, experienced and fully qualified personnel.
13. The paint used shall be line paint made specifically for painting athletic running tracks.

14. The markings shall include all events and marks required or recommended by all local and national associations (whichever governing body is appropriate), including all hurdle and acceleration marks.

C. Clean Up: The Contractor shall remove all bags, pallets, plastic or any other items associated with their work and leave the site in the same state of cleanliness as it was when they arrived.

END OF SECTION 32 18 37

SECTION 32 31 13 - CHAIN LINK FENCES AND GATES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes chain-link fences and swing gates.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Minimum Post Size: Determine according to ASTM F 1043 for framework up to 8 feet high, and post spacing not to exceed 10 feet.

1.3 SUBMITTALS

A. Options in subparagraphs below are examples only; revise to suit Project. Consult a structural engineer experienced in design wind loads applicable to Project. Verify compliance with codes. See Evaluations.

B. Product Data: For each type of product indicated

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

D. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. The Contractor shall provide engineered drawings for the rolling gate design.

E. Product Certificates: For each type of chain-link fence and gate, from manufacturer.

F. Product Test Reports: For framing strength according to ASTM F 1043.

G. Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, deterioration of metals, metal finishes, and other materials beyond normal weathering.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 Fence components shall be black vinyl-coated to comply with CLFMI Product Manual, as noted on the drawings.

2.2 CHAIN-LINK FENCE FABRIC

A. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:

1. Fabric Height: As indicated on Drawings.
2. Steel Wire Fabric: Wire with a diameter of 0.149 inch (9 gauge).

a. Mesh Size: 2 inches.
b. Zinc-Coated Fabric: ASTM A 392, Type II, Class 2, 2.0 oz./sq. ft. with zinc coating applied before weaving.
c. Polymer-Coated Fabric: ASTM F668 over zinc-coated steel wire. Color: Black

3. Selvage: Knuckled at both selvages, except for fences greater than 60 inches high, then it should be twisted at top selvage and knuckled at bottom.

2.3 FENCE FRAMING

A. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:

1. Fence Height: As indicated on Drawings.

a. Line Post: Per details.

b. End, Corner and Pull Post: Per details.

2. Horizontal Framework Members: top and bottom rails complying with ASTM F 1043.
3. Brace Rails: Comply with ASTM F 1043. Fencing over 6' ht. shall include a center horizontal rail.
4. Metallic Coating for Steel Framing: Type A zinc coating.
5. Polymer-Coated Fabric: ASTM F668 over zinc-coated steel wire. Color: Black

2.4 SWING GATES

A. General: Comply with ASTM F 900 for gate posts and single and double swing gate types.

1. Gate Leaf Width: As indicated.
2. Gate Fabric Height: Match fence height.
3. Gate Finish: Match fence finish

B. Pipe and Tubing:

1. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing.
2. Gate Posts: Round tubular steel
3. Gate Frames and Bracing: Round tubular steel

C. Frame Corner Construction: Welded.

D. Hardware:

1. Hinges: confirm with owner desired swing direction prior to fabrications.
2. Latches permitting operation from both sides of fence.
3. Hinges, center gate stops for double gates and, for each gate leaf more than 5' wide, keepers and wheel rollers. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate.

2.5 FITTINGS

A. General: Comply with ASTM F 626.

1. Provide line posts with arms that accommodate top rail or tension wire.
2. Provide corner arms at fence corner posts.
3. Finish to match fence/gate.

2.6 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.

1. Do not begin installation before final grading is completed unless otherwise permitted by Engineer.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet (or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

D. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.

E. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

F. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.

1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter. Install per plan. Concrete shall not daylight.

G. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment.

H. Line Posts: Space line posts uniformly at 10 feet o.c.

I. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave 1 inch between finish grade or surface and bottom selvage unless otherwise indicated.

J. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

K. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 32 31 13

SECTION 32 33 00 – MISC. SITE IMPROVEMENTS

PART-1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Outdoor athletic equipment.
2. Miscellaneous site improvements.

1.3 SUBMITTALS

A. Product Data: Manufacturer's technical and descriptive literature for each item specified.

B. Shop Drawings: Submit shop drawings which fully and comprehensively detail all items of equipment, with erection and installation requirements, for the Engineer's review and acceptance prior to delivery of any such equipment. Show recommended concrete footing locations, depth and size.

C. Samples:

1. Show selected finishes for equipment and furnishings.

1.3 REFERENCES

A. Certain specifications of the following organizations are referred to and included herein as though repeated in full.

1. PDT, PaDOT, or PennDOT: Pennsylvania Department of Transportation - Publication 408.
2. ASTM: American Society for Testing Materials, Latest Edition.

PART 2 - PRODUCTS

2.1 BASIC MATERIALS

A. Poured-in-place concrete work (class AA – 3500 psi) shall be as specified in PennDOT publication 408 Specifications for Cement Concrete, Section 704.1.

B. Precast Concrete Components: Standard products of manufacturers having regular production of types and quality of roadway type fittings conforming to PennDOT Publication 408 specifications.

2.2 OUTDOOR ATHLETIC EQUIPMENT

A. FOOTBALL GOALS

1. Furnish and install set of two (2) AdjustRight Ground Sleeve Football Goals, 30' ht. uprights, 8' offset, ground sleeve installation, Model GP830HS, **White** powder-coated finish as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.
2. Furnish and install set of two (2) 30" Access Frame with Infill Retainer System, Model GPAFITRC30 as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.
   a. Provide and install 1" PVC drain line from access frame to nearest underdrain collector pipe.
3. Furnish set of two (2) Round Goal Post Pads, Model GPPRDG, Maron color to match school color, with Falcon logo from center of turf field, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal. Submit color and graphic options for approval.

B. POLE VAULT BOX

1. Furnish and install one (1) Stainless Steel Pole Vault Box, Model PVBSS, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.
2. Furnish and install one (1) Aluminum Vault Box Plug, Model PVBCPSS, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.
   a. Apply track surfacing material to recessed top to match surrounding color.

B. SHOT PUT

1. Furnish and install one (1) Shot Put Throw Ring for recessed pad, Model TRSPHAA, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.
2. Furnish and install one (1) Shot Put Toe Board for recessed pad, Model SPTBCARHS, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.

C. DISCUS

1. Furnish and install one (1) Discus Throw Ring for recessed pad, Model TRDAA, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.
2. Furnish and install one (1) High School Eight Pole Discus Cage with Extension Arms and ground sleeves, Black powder-coated finish, Model DCHS8EA, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal.

2.3 OUTDOOR MISCELLANEOUS PRODUCTS

A. BALL CONTROL NETTING

1. Furnish and install StormGuard Breakaway Ball Safety Netting System, Model BSS420, 4” dia. aluminum poles, black powder-coated finish, as provided by Sportsfield Specialties, 41155 State Highway 10, PO Box 231, Delhi, NY 13753, 888-975-3343, or approved equal. Quantity and location shown on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION: GENERAL

A. Assemble and install miscellaneous improvements in accordance with manufacturer’s written instructions, the requirements specified under Parts 1 and 2 of this Section, and in conformance with the Drawings and Shop Drawings.

END OF SECTION 32 33 00

SECTION 32 91 13 - SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

Section includes planting soils specified by composition of the mixes.

A. Related Requirements:
1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
2. Section 329200 "Turf and Grasses" for placing planting soil for turf and grasses.
3. Section 329300 "Plants" for placing planting soil for plantings.

1.3 DEFINITIONS

A. AAPFCO: Association of American Plant Food Control Officials.

B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended or un-amended soil as indicated.

C. CEC: Cation exchange capacity.

D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.

E. Imported Soil: Soil that is transported to Project site for use.

F. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through inter-laboratory sample exchanges and statistical evaluation of analytical data.

G. Organic Matter: The total of organic materials in soil exclusive of un-decayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

H. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. The word Topsoil and Planting Soil shall be considered the same. All lawn areas are to receive six (6) inches of Planting Soil.

I. RCRA Metals: Hazardous metals identified by the EPA under the Resource Conservation and Recovery Act.

J. SSSA: Soil Science Society of America.

K. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

L. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

M. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.

N. USCC: U.S. Composting Council.

1.4 PRE-INSTALLATION MEETINGS

A. Pre-installation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include recommendations for application and use.
   2. Include test data substantiating that products comply with requirements.
   3. Include sieve analyses for aggregate materials.
   4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
      a. Manufacturer's qualified testing agency's certified analysis of standard products.
      b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
      c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the

experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1.8 PRE-CONSTRUCTION TESTING

A. Pre-construction Testing Service: Owner will engage a qualified testing agency to perform pre-construction soil analyses on existing, on-site soil.
   1. Notify Architect seven days in advance of the dates and times when laboratory samples will be taken.

B. Preconstruction Soil Analyses: For each un-amended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
   1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.9 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Architect under the direction of the testing agency.
   1. Number and Location of Samples: Minimum of three representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.
   2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."
   3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
   4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.10 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:
   1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
      a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
      b. Hydrometer Method: Report percentages of sand, silt, and clay.

2. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
3. Water Retention: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."
4. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).

C. Chemical Testing:
1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."
2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1- Physical and Mineralogical Methods."
3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.
4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chlorides, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc.

D. Fertility Testing: Soil-fertility analysis according to standard laboratory protocol of SSSA NAPT NCR-13, including the following:
1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
5. Nitrogen ppm.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
9. Manganese-availability ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm and sodium absorption ratio.
14. Soluble-salts ppm.
15. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods of Soil Analysis - Part 3- Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum,

recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 6-inch depth of soil.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

A. General: Soil amendments, fertilizers, and rates of application specified in this article are guidelines that may need revision based on testing laboratory's recommendations after preconstruction soil analyses are performed.

B. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; modified to produce viable planting soil. Blend existing, on-site surface soil with the soil amendments and fertilizers in rates and quantities as recommended by Testing Agency.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
2. Form: Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Perlite: Horticultural perlite, soil amendment grade.

E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.3 ORGANIC SOIL AMENDMENTS

A. Manure: Well-rotted, un-leached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
   1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.

C. Proceed with placement only after unsatisfactory conditions have been corrected.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, metal and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass un-amended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix un-amended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Apply, add soil amendments, and mix approximately half the thickness of un-amended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Mixing: Spread un-amended soil to total depth of 6 inches, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.
   1. Amendments: Apply soil amendments, except compost, and fertilizer, if required, evenly on surface, and thoroughly blend them with un-amended soil to produce planting soil.

D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:
   1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 1000 sq. ft. of in-place soil or part thereof.

C. Soil will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.5 PROTECTION

A. Protection Zone: Identify protection zones according to description on the Drawings.

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Vehicle traffic.
   4. Foot traffic.
   5. Erection of sheds or structures.
   6. Impoundment of water.
   7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is over-compacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and replace contaminated planting soil with new planting soil.

3.6 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
   1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 32 91 13

SECTION 32 92 00 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Seeding.
   2. Hydroseeding.
   3. Sodding.

B. Related Sections:
   1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
   2. Section 312000 "Earth Moving" for excavation, filling and backfilling, and rough

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers, from manufacturer.

E. Material Test Reports: For existing surface soil and imported topsoil.

F. Planting Schedule: Indicating anticipated planting dates for each type of planting.

G. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required initial maintenance periods.

H. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.
   1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.
   2. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

I. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

J. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.
   1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

K. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.6 PROJECT CONDITIONS

A. Planting Restrictions: Plant during the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.
1. Fall Planting: Between September 1st and October 15th
2. Spring Planting: Between April 15th and May 30th

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.7 MAINTENANCE SERVICE

A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:
1. Seeded Lawns: 30 days from date of Substantial Completion
    a. When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
2. Contractor shall coordinate with owner the transition of maintenance including the mowing and watering requirements.

B. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. The percentage of pure seed present shall represent the freedom of such agriculture seeds from inert matter and from other seeds distinguishable by their appearance. The percentage of germination shown shall be actual sprouts, and shall not include "hard seeds," unless specifically permitted. Seed proposed under this item shall be subject to analysis test by the Commonwealth of Pennsylvania, Department of Agriculture, Bureau of Plant Industry, and shall meet these Specifications. No seed shall be accepted with a date of test greater than six months prior to the date of sowing, and shall be of the most recent crop.

C. Seed Species: Seed shall be furnished in separate varieties, individually packaged, and subject to examination by the Construction Manager before mixing. State-certified seed of grass species, as follows:

D. Seed Mixes
   1. Temporary Seed Mixture
      a. Temporary seeding shall consist of annual ryegrass (100 percent by weight), or equivalent, and shall be placed at the rate of 5 pounds per 1,000 square yards. Temporary seeding shall be applied to those areas that are a potential erosion problem during construction and to those areas exposed for longer than 20 calendar days. If conditions do not permit temporary seeding, mulching shall be employed. Additionally, nitrogen fertilizer (50-50-50) at one (1) ton per acre, agricultural lime at one (1) ton per acre, and straw mulch at three (3) tons per acre. Straw mulch shall be applied in long strands, not chopped or finely broken.
   2. Permanent Seed Mixture:
      a. 100 percent turf type tall fescue (by Jacklin Seed, or approved equal).
   3.
   4. Specialty Seed Mix:
      a. Ernst Seed mix as identified on the drawings or approved equal.
      b. Cover crop at the type (based on season) and rates recommended by the specialty seed manufacturer.

2.2 INORGANIC SOIL AMENDMENTS

A. Lime: Per PENNDOT Publication 408 specifications

B. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 4 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Sift soil free of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
   a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches deep; do not obtain from bogs or marshes.

2.3 SOIL SUPPLEMENTS

A. General: Soil testing should be done prior to seeding and mulching to determine the proper soil amendments and application rates for the proposed seed mixtures.

B. Pulverized limestone shall meet the requirements of the latest Commonwealth of Pennsylvania Specification L-36 for Group 1, Class B, Type MO.

C. Commercial fertilizers shall be 10-20-20 (Basic Fertilizer), in addition to 16-8-8 (Starter Fertilizer), or as specified. Chemical analysis shall be guaranteed and clearly shown on each bag. Fertilizer for use in hydraulic seeders shall be in pellet or granular form, highly soluble in water, and shall, in addition, contain 1% magnesium oxide and 5 lbs. of borate per ton. The derivation of fertilizer elements shall be as follows:
   1. Nitrogen: Ammonium sulfate, ammonium nitrate, or ammonium phosphate.
   2. Phosphorus: Phosphoric acid, calcium phosphate, ammonium phosphate.
   3. Potassium: Muriate of potash.

D. Compost shall be a well decomposed, stable, weed free organic matter source. It shall be derived from agricultural, food, or industrial residuals; biosolids (treated sewage sludge); yard trimmings, or source-separated or mixed solid waste. The product shall contain no substances toxic to plants, will possess no objectionable odors and shall not resemble the raw material from which it was derived.

E. Only compost products that meet all applicable state and federal regulations pertaining to its production and distribution may be used in this application. Approved compost products must meet related state and federal chemical contaminant (e.g., heavy metals, pesticides, etc.) and pathogen limit standards pertaining to the feedstocks (source materials) in which it is derived.

2.4 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade per PENNDOT Publication 408 Specifications.

B. Slow-Release Fertilizer: Commercial-grade per PENNDOT Publication 408 Specifications.

C. Planting Soil Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-sit. Verify suitability of

native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
1. Supplement with planting soil when quantities are insufficient.

2.5 MULCHES

A. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

C. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.6 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.7 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
   1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
   2. Protect grade stakes set by others until directed to remove them.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 LIMING

A. Apply pulverized limestone as follows:

   1. Where lime requirement test has been made, spread and work into a 4 to 6 in. soil depth enough ground limestone to fully meet the requirement shown by the test.
   2. Where lime requirement exceeds 200 lbs. per 1,000 sq. ft., apply half of the total requirement, till, and apply the remaining half.
   3. Where lime requirement test is not available, broadcast and work into a 4 to 6 in. soil depth 100 lbs. of ground limestone per 1,000 sq. ft.

3.4 BASIC FERTILIZER

A. Apply prior to application of starter fertilizer.

B. Where a complete soil test has been made, broadcast the required amount of recommended fertilizer and work into the soil to a 4 to 6 in. depth; or, where a complete soil test has not been made, broadcast and work in deeply (4 to 6 in.) 20 lbs. of 0-25-25 fertilizer or equivalent per 1,000 sq. ft.

3.5 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
   1. Apply superphosphate fertilizer directly to subgrade before loosening.
   2. Spread topsoil to a depth 6 inches but not less than required to meet finish grades after light rolling and natural settlement, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
      a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
      b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth 8 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
   a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
   b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
   1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
   2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 6 inches of soil. Till soil to a homogeneous mixture of fine texture.
   3. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
   4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Construction Manager’s acceptance of finished grading, restore areas if eroded or otherwise disturbed after finish grading.

3.6 STARTER FERTILIZER

A. Immediately before seeding, apply a starter fertilizer by broadcasting and raking into a depth of 1 in., 10 lbs. of a 16-8-8 fertilizer per 1,000 sq. ft. At least 35% of the total nitrogen shall be water insoluble nitrogen (nitrogen from natural organic sources, such as ureaform).

3.7 SEEDING

A. Before seed is sown, rake and dress soil surface to form proper seedbed, free of roots, concrete slurry, concrete material or chunks, pavement, cement, plaster or building debris, and remove stones larger than 1” in any dimension from the seed bed by raking or rockhounding.

B. Lawn seed mix shall be applied at a rate specified by Seeding Schedule on drawings.

C. Finish grades shall be of smooth, uniform flow without depressions or rises, with gradual and uniform transition at slopes and embankments. Maximum allowable tolerance in finish grades shall be not more than 1 in. in 10 ft. 0 in., or 3 in. in 100 ft. 0 in.

D. Employ a satisfactory method of sowing, making use of mechanical hand seeders. Broadcast seeding, either by hand or by sowing equipment acceptable to the Architect, may also be used to uniformly distribute seed on the designated areas, in which case 1/2 of the seed shall be sown when the sower is moving in one direction, and the remainder shall be sown at right angles to the first sowing. After the seed has been sown, it shall be covered to an average depth of 1/4 in. by means of rake or other device acceptable to the Construction Manager.

3.8 MULCHING

A. Lawn Areas: Place mulch within 48 hours after seeding. Apply at an average minimum depth of 2 in. loose measurement. Take care when placing mulch not to disturb the seeded surfaces. Secure mulch by one or several of the following methods, depending on the size of the area, steepness of slope, availability of equipment, and cost:

1. Non-Asphaltic Emulsion may be utilized to secure mulch. Asphalt emulsion shall be nontoxic, conforming to AASHTO M-140, Type SS-1, and to requirements specified for Class E-1 or E-6 in Penn DOT Bulletin No. 25. It shall contain no solvents or other diluting agents toxic to plant life, and not more than 0.75% of saponificable acids. Apply uniformly at the rate of 28 gal. per 1,000 sq. yds.
2. Terra Tack II, produced by Grass Growers of Plainfield, NJ, may be used to secure mulch. Apply by hydroseeder as an overspray to straw mulch. Mix in accordance with manufacturer's instructions and apply at the rate of 45 lbs. of Terra Tack II (Part A and B), 750 gal. of water and 150 lbs. of wood cellulose fiber per acre. Terra Tack II, in the previous mix, is an overspray to straw only and is not meant as a mulch in itself.
3. Mulch nettings may be utilized to secure mulch. Staple lightweight paper, jute, cotton, or plastic nettings to soil surface according to manufacturer's recommendations.

B. If the Contractor proposes the use of hydroseeding, he must obtain prior acceptance for the process from the Architect.

C. The Contractor shall, during the life of the Contract, properly care for all areas and mulches, performing such mulching as necessary to provide protection for established growth on the treated areas.

3.9 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic fiber-mulch manufacturer's recommended tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.10 LAWN RENOVATION

A. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
   1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.
   2. Provide new topsoil as required.

B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

D. Mow, dethatch, core aerate, and rake existing lawn.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches of existing soil. Provide new planting soil to fill low spots and meet finish grades.

I. Apply seed and protect with straw mulch as required for new lawns.

J. Water newly planted areas and keep moist until new lawn is established.

3.11 LAWN MAINTENANCE

A. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn. Provide materials and installation the same as those used in the original installation.
   1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

B. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.
   1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
   2. Water lawn with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

D.
   1. Mow grass to a height of 2 to 3 inches.
   2. Contractor shall assume minimum 2 mowings of lawn areas once suitable stands of grass have been established.
   3. Coordinate with owner when mowing will end and their maintenance crews will need to assume mowing.

E. Lawn Post-fertilization: Apply fertilizer after initial mowing and when grass is dry.
   1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.
   2. Compost Application Procedure.
   3. Rototill to a depth of 12”. If the soil is too dense for a rototiller, the soil should first be broken up into large aggregates using a soil ripper.
   4. Clear surface of obstructions. The soil surface shall be reasonably free of large clods, roots, stones greater than 2 inches, and other material which will interfere with planting and subsequent site maintenance.
   5. Distribute compost evenly to a depth of two inches over the soil surface. For small areas, compost may be spread by hand with a shovel and raked evenly over the soil. For larger areas, use a tractor-mounted spreader or other similar device.
   6. Spread lime and nutrients as indicated by soil testing.
   7. Re-rototill several times in perpendicular directions to incorporate compost and other soil amendments.
   8. Water thoroughly. Allow soil to settle for one week. If compost is immature, extend settling period to two to five weeks.
   9. Fine grade.
   10. Hand roll.

3.12 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 32 92 00

SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Planting soils.

B. Related Sections:

1. Section 311000 "Site Clearing" for protection of existing trees and plantings, topsoil stripping and stockpiling, and site clearing.
2. Section 312000 "Earth Moving" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
3. Section 329200 "Turf and Grasses" for turf (lawn) planting and erosion-control materials.

1.3 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

D. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

G. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

H. Planting Area: Areas to be planted.

I. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; or imported topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

J. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

K. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

L. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

M. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

N. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

O. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated, including soils.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.

B. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

C. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

D. Material Test Reports: For existing native surface topsoil and imported topsoil.

E. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before start of required maintenance periods.

F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Three years' experience in landscape installation in addition to requirements in Section 014500 "Quality Control."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation and maintenance specialty area(s), designated CLT-Exterior.
    b. Certified Ornamental Landscape Professional, designated COLP.

5. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.

2. The soil-testing laboratory shall oversee soil sampling; with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
3. Report suitability of tested soil for plant growth.

    a. Based upon the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

D. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

E. Measurements: Measure according to ANSI Z60.1 and according to manufacturer's requirements.

F. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Landscape Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

G. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

C. Handle planting stock by container.

D. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Do not remove container-grown stock from containers before time of planting.
2. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Architect no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Architect's written permission.

C. Planting Restrictions: Plant during one of the periods as specified in the PA BMP Manual, latest edition. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

D. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.8 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner, or incidents that are beyond Contractor's control.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of tree stabilization.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods from Date of Substantial Completion:

a. Trees: 12 months

3. Include the following remedial actions as a minimum:

a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
c. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
1. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with the Drawings.

C. Labeling: Provide summary list and quantity of plants installed.

2.2 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic

sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts shown on approved Erosion and Sedimentation Control Plan.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 PLANTING AREA ESTABLISHMENT

A. Loosen subgrade of planting areas to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply fertilizer directly to subgrade before loosening in accordance with manufacturer's recommendations.
2. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, *watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.

*Contractor is required to water plants a minimum thirty (30) days after substantial completion. Coordinate with owner prior to ending watering to transition watering requirements.

B. Fill in as necessary soil subsidence that may occur because of settling or other processes.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.5 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

C. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.6 DISPOSAL

A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 32 93 00

SECTION 33 11 13 - FACILITY WATER DISTRIBUTION & PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service, fire-service mains, and combined water service and fire-service mains. All water lines, associated appurtenances, meters and meter pit shall be constructed in accordance with the rules and regulations of the Pottstown Borough Authority.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.

C. Field quality-control test reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of the Pottstown Borough Authority supplying water and owner. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

D. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

E. NSF Compliance:

1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including fire hydrants, according to the following:

1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

F. Protect flanges, fittings, and specialties from moisture and dirt.

G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Engineer and Owner no fewer than seven business days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Engineer's written permission.

1.8 COORDINATION

A. Coordinate connections to water main with the Pottstown Borough Authority representatives.

PART 2 - PRODUCTS

2.1 DUCTILE IRON PIPE

A. Ductile Iron Pipe shall be Class 52 (minimum) and must be manufactured in accordance with ANSI/AWWA C150 & C151 standards for ductile iron pipe, centrifugally cast.

B. Joints for ductile iron pipe shall be of a restrained joint type, such as Field-lok Restrained Joint Gaskets or equal and are required at each joint and shall comply with ANSI/AWWA C111/A2.11 standards.

C. All ductile iron pipe shall be cement lined and coated inside and outside with a bituminous seal coat in accordance with ANSI/AWWA C104 standards. The thickness of the lining shall NOT be less than one-eighth (1/8") inch for four (4") inch thru twelve (12") inch diameter pipe and shall NOT be less then three-sixteenths (3/16") inches for fourteen (14") inch thru twenty-four (24") inch diameter pipe.

2.2 GATE VALVES

A. Provide gate valves meeting the specifications of the Pottstown Borough Authority

B. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.

c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
d. Crane Co.; Crane Valve Group; Stockham Div.
e. East Jordan Iron Works, Inc.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.
h. McWane, Inc.; M & H Valve Company Div.
i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
j. Mueller Co.; Water Products Div.
k. NIBCO INC.
l. U.S. Pipe and Foundry Company.

2. Nonrising-Stem, Resilient-Seated Gate Valves:

a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Mechanical joint.
4) Interior Coating: Complying with AWWA C550.

2.3 GATE VALVE ACCESSORIES AND SPECIALTIES

A. Tapping-Sleeve Assemblies: Provide tapping sleeve assembly meeting the specifications of the Pottstown Borough Authority.

B. Valve Boxes: Provide valve boxes meeting the specifications of the Pottstown Borough Authority.

C. Indicator Posts: Provide indicator posts (if required) meeting the specifications of the Pottstown Borough Authority.

2.4 CORPORATION STOPS AND CURB STOPS

A. Provide corporation stops meeting specifications of the Pottstown Borough Authority

B. Provide curb stops meeting specifications of the Pottstown Borough Authority.

2.5 JOINING MATERIALS

A. Refer to manufacturer’s recommendations for commonly used joining materials.

2.6 PIPING SPECIALTIES

A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.7 SPECIAL PIPE FITTINGS

A. All special pipe fittings to meet the specifications of the Pottstown Borough Authority.

2.8 JOINING MATERIALS

A. Brazing Filler Metals: AWS A5.8, BCuP Series.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Section 31 20 00 "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground water-service piping NPS 3 to NPS 8 shall be the following:

1. Ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical joints.

F. Coordinate all work associated with removal or new service connections with the Pottstown Borough Authority.

3.3 VALVE APPLICATIONS

A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use corporation stops and stops with ends compatible with piping, for NPS 2 and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.

3.4 PIPING INSTALLATION

A. Water-Main Connection: Tap existing water main in the location shown on the plan in the presence of owner, and of size indicated.

B. Make connections larger than NPS 2 with tapping machine according to the following:

1. Install tapping sleeve and tapping valve according to MSS SP-60.
2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.

C. Bury piping with depth of cover over top at least 48 inches, with top at least 12 inches below level of maximum frost penetration, and according to the following:

D. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.

1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

E. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

F. See Section 221116 "Domestic Water Piping" and/or Plumbing Drawings for potable-water piping inside the building.

3.5 JOINT CONSTRUCTION

A. Make pipe joints according to the following:

1. PE Piping Joints: Use joining materials according to pipe manufacturer's written instructions.
2. Ductile Iron Joints: Construct joints according to the Pottstown Borough Authority.

3.6 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:

1. Concrete thrust blocks.
2. Locking mechanical joints.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
2. Fire-Service-Main Piping: According to NFPA 24.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.7 VALVE INSTALLATION

A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

B. Corporation Stops and Curb Stops: Install each underground curb stop with head pointed up and with service box.

3.8 CONNECTIONS

A. Connect water-distribution piping to existing water main in the presence of Owner personnel. Use tapping sleeve and tapping valve.

B. Connect water-distribution piping to interior domestic water piping.

3.9 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.

1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.

C. Prepare reports of testing activities.

3.10 IDENTIFICATION

A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

3.11 CLEANING

A. Clean and disinfect water-distribution piping as required by the Pottstown Borough Authority.

3.12 BOROUGH AUTHORITY REQUIREMENTS

A. General - All materials and installation shall conform to all Pottstown Borough Authority (PBA) requirements. All materials in contact with potable water shall have an NSF 61 certification.

END OF SECTION 33 11 13

SECTION 33 13 13 - FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Cleanouts.

1.3 SUBMITTALS

A. Product Data: For the following:

1. Pipes and fittings.

B. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

C. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Engineer no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without Engineer's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.2 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Cascade Waterworks Mfg.
   b. Dallas Specialty & Mfg. Co.
   c. Mission Rubber Company; a division of MCP Industries, Inc.

2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

2.3 CLEANOUTS

A. PVC Cleanouts:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Canplas LLC.
   b. IPS Corporation.

c. NDS.
d. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
e. Sioux Chief Manufacturing Company, Inc.
f. Zurn Light Commercial Products Operation; Zurn Plumbing Products Group.
g. Or approved equal.

2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. Provide lid and frame per details.

2.4 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints, and in conformance with Lower Allen Township Authority requirements.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches.
10. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch- minimum-width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

C. Inside Drop Bowl:

1. Provide inside drop bowl where required on Drawings per Lower Allen Township Authority requirements (or approved equal).

2.5 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 31 20 00 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping with 48-inch minimum cover.
4. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure, drainage piping according to the following:
   1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints, and according to the requirements of Lower Allen Township Authority.

3.4 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.

   1. Install per detail on drawings.

B. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

A. Connect non-pressure, gravity-flow drainage piping to building's sanitary building drains specified in Section 22 13 16 "Sanitary Waste and Vent Piping".

B. Make connections to existing manhole per (and in the presence of) Lower Allen Township Authority.

3.7 IDENTIFICATION

A. Comply with requirements in Section 31 20 00 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

   1. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.8 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

    a. Fill sewer piping with water. Test with pressure of at least 10-foot head of water and maintain such pressure without leakage for at least 15 minutes.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.9 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 33 13 13

SECTION 33 41 00 - STORM UTILITY DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. PE Pipe and fittings.
2. Nonpressure pipe couplings.
3. Concrete headwalls / endwalls.
4. Stormwater inlets.
5. Yard drains
6. Synthetic turf field drains
7. Pipe outlets and rock aprons.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings:
1. Stormwater inlets. Include plans, elevations, sections, details, frames, covers, and grates.

C. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.

D. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet and vertical scale of not less than 1 inch equals 5 feet. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.

E. Field quality-control reports.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

C. Handle stormwater inlets according to manufacturer's written rigging instructions.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify engineer and/or Owner no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of service without engineer's and/or owner's written permission.

PART 2 - PRODUCTS

2.1 PE PIPE AND FITTINGS

A. Corrugated PE Drainage Pipe and Fittings 4" to 10": N-12 WT IB pipe (or approved equal) per AASHTO M252, Type S, with smooth waterway for coupling joints. All drainage pipes and fittings shall provide a watertight system, except where perforated pipes are identified on the plans.

1. Pipe shall be joined with N-12 WT IB (or approved equal) meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the watertight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.

B. Corrugated PE Pipe and Fittings 12" to 60": N-12 WT IB pipe (or approved equal)(per AASHTO) AASHTO M 294, Type S, with smooth waterway for coupling joints.

1. Pipe shall be joined with N-12 WT IB (or approved equal) meeting the requirements of AASHTO M252, AASHTO M294, or ASTM F2306. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the watertight joint performance requirements of AASHTO M252, AASHTO M294, or ASTM F2306.

C. 4 inch through 60 inch shall be watertight according to the requirements of ASTM D3212. Gaskets shall meet the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

D. 12 inch through 60 inch diameters shall have a reinforced bell with a polymer composite band. The bell tolerance device shall be installed by the manufacturer.

E. Field Pipe and Joint Performance - To assure watertightness, field performance shall be high-density polyethylene conforming with the minimum requirements of cell classification 424420C for 4-through 10-inch diameters, and 435400C for 12-through 60-inch diameters, as defined and described in the latest version of ASTM D3350, except that carbon black content should not exceed 4%. The 12-through 60-inch virgin pipe material shall comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 AASHTO M294 and ASTM F2306 respectively.

2.2 PVC PIPE AND FITTINGS

A. PVC Type Storm Sewer Piping:

1. Pipe: ASTM D1785, Schedule 40 PVC, with plain ends for solvent-cemented joints.
2. Fittings: ASTM D2466, Schedule 40 PVC, socket type.

B. Perforated PVC Sewer Pipe and Fittings: ASTM D 2729, bell-and-spigot ends, for loose joints

2.3 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Shielded, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Cascade Waterworks Mfg.
   b. Dallas Specialty & Mfg. Co.
   c. Mission Rubber Company; a division of MCP Industries, Inc.

2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Ring-Type, Flexible Couplings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. Fernco Inc.
   b. Logan Clay Pipe.
   c. Mission Rubber Company; a division of MCP Industries, Inc.

2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

2.4 POLYMER TRENCH / CHANNEL DRAINS

A. Polymer trench / channel drains shall be ACO System 4000, with 9.9" constant depth channel sections (Channel 4020) and polyethylene grate (Model 97393) as manufactured by ACO, Inc., 9470 Pinecone Drive, Mentor, OH 44060 or approved equal.

B. Drain grates for trench drains shall be black polypropylene, UV stabilized, ADA compliant grates with 'QuikLoc' locking mechanism, or approved equal

C. Catch basins for trench drain system shall be ACO trench drains intended for use with System 4000.

   1. Provide matching black grate and locking mechanism as for System 4000 trench drains.
   2. Provide plastic trash bucket for all catch basins. Provide oval to round invert adapters where required.

D. Use solid closing end caps at terminations as shown on the drawings.

2.5 CONCRETE

A. General: Cast-in-place concrete according to ACI 318, ACI 350/350R, and the following:

   1. Cement: ASTM C 150, Type II.
   2. Fine Aggregate: ASTM C 33, sand.
   3. Coarse Aggregate: ASTM C 33, crushed gravel.
   4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

   1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
   2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

2.6 STORMWATER INLETS

A. Curb Inlets: Made with vertical curb opening of materials and dimensions according to PennDOT standards.

B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to PennDOT standards. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to PennDOT standards. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy duty, according to PennDOT standards.

2.7 YARD INLETS

A. Structures to be 2’ x 2’ concrete catch basins as shown on the construction drawings.

Frames and Grates: Heavy duty cast iron. All yard inlets in pedestrian areas shall have ADA compliant grates installed.

2.8 ROCK APRONS

A. Rock Aprons: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."

1. Average Size: NSSGA No. R-3, screen opening 2 inches.
2. Average Size: NSSGA No. R-4, screen opening 3 inches.
3. Average Size: NSSGA No. R-5, screen opening 5 inches.

B. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

D. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

E. Install gravity-flow, nonpressure drainage piping according to the following:

1. Install piping pitched down in direction of flow.
2. Install piping with 12-inch minimum cover.
3. Install PE corrugated sewer piping according to ASTM D 2321.
4. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
5. Install PVC water-service piping according to ASTM D 2321 and ASTM F 1668.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, nonpressure drainage piping according to the following:

1. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
2. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
3. Join dissimilar pipe materials with nonpressure-type flexible couplings.

3.4 STORMWATER INLET INSTALLATION

A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.

B. Construct riprap of broken stone, as indicated.

C. Install outlets that spill onto grade, anchored with concrete, where indicated.

D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.

E. Trim pipes to inside face of structures.

F. Construct energy dissipaters at outlets, as indicated.

3.5 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.6 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

3.7 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Re-inspect and repeat procedure until results are satisfactory.

3.8 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush with water.

END OF SECTION 33 41 00