project manual

THE CHURCH OF
JESUS CHRIST
OF LATTER-DAY SAINTS

Taylor 1,2,3,4
Ogden UT West Stake
2167 South 4100 West - Ogden, Utah

Project Number: 502253324010201

bradley gygi architect & associates, pllc
PO Box 521048 • salt lake city, utah 84152
801•747•2451

structural engineer
ARW Structural Engineers
1594 West Park Circle
Ogden, Utah 84404
801.782.6008

electrical engineer
Envision Engineering
240 East Morris Ave., Suite 200
Salt Lake City, Utah 84115
801.534.1130

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Professional Consultants

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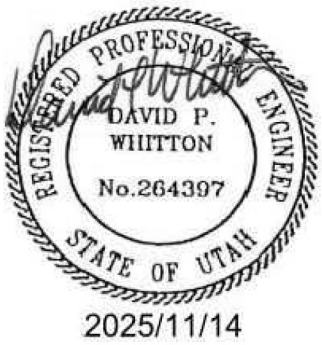

2025/11/14

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END OF SECTION

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BIDDING REQUIREMENTS

FIXED SUM PROJECT (U.S.)

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INVITATION TO BID (U.S.)

1. GENERAL CONTRACTORS INVITED TO BID THE PROJECT:

To Be Determined

2. PROJECT:

Hooper Stake Cultural Hall
Hooper UT Stake
Project Number: 502942823010101

3. LOCATION:

6150 West 5600 South
Hooper, UT

4. OWNER:

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole
c/o
Craig Homer, Utah North PM Office
435 North Wall Ave. Ste. D
Ogden, UT 84404

5. CONSULTANT:

Bradley Gygi Architect & Associates, PLLC
PO Box 521048, Salt Lake City, UT 84152

6. DESCRIPTION OF PROJECT:

A. Reroofing and roof seismic upgrades at an existing building.

B. Products or systems may be provided through relationships the Owner has negotiated with suppliers as indicated in the Specifications.

7. TYPE OF BID: Bids will be on a lump-sum basis. Segregated bids will not be accepted.

8. TIME OF SUBSTANTIAL COMPLETION: The time limit for substantial completion of this work will be ninety (90) calendar days and will be as noted in the Agreement.

9. BID OPENING: Bids will be received by Owners preferred method at time and date at place to be announced. Bids will be publicly opened at time and date at place to be announced.

10. BIDDING DOCUMENTS:

A. Bidding Documents may be examined at the following plan room locations:

1) Dodge Data and Analytics
Office # (859) 885-1091
Fax # (801) 606-7722
email: kim.mccallon@construction.com

B. Bidding Documents may be obtained from the Architect.

C. Bidding Documents may be obtained from Owner's electronic bidding tool.

11. BID BOND: If required, bid security in the amount of 5 percent (5%) of the bid will accompany each bid in accordance with the Instruction to Bidders.

12. BIDDER'S QUALIFICATIONS: Bidding by the General Contractors will be by invitation only.

13. OWNER'S RIGHT TO REJECT BIDS: The Owner reserves the right to reject any or all bids and to waive any irregularity therein.

END OF DOCUMENT

INSTRUCTIONS TO BIDDERS (U.S.)

1. DEFINITIONS:

A. The definitions set forth in Section 1 of the General Conditions are applicable to the documents included under Bidding Requirements.

B. Bidding Documents include the Bidding Requirements and the proposed Contract Documents. The proposed Contract Documents consist of the documents identified as Contract Documents in the Form of Agreement, except for Modifications. The Bidding Requirements are those documents identified as such in the proposed Project Manual.

C. Addenda are written, or graphic documents issued by the Architect prior to execution of the Contract which modify or interpret the Bidding Documents. They become part of the Contract Documents as noted in the Form of Agreement upon execution of the Contract.

2. BIDDER'S REPRESENTATIONS:

A. By submitting a bid, the bidder represents that
   1) Bidder has carefully studied and compared the Bidding Documents with each other. Bidder understands the Bidding Documents and the bid is fully in accordance with the requirements of those documents,
   2) Bidder has thoroughly examined the site and any building located thereon, has become familiar with local conditions which might directly or indirectly affect the contract work, and has correlated its personal observations with the requirements of the proposed Contract Documents, and
   3) Bid is based on the materials, equipment, and systems required by the Bidding Documents without exception.

3. BIDDING DOCUMENTS:

A. Copies
   1) Bidding Documents may be obtained as set forth in the Invitation to Bid.
   2) Partial sets of Bidding Documents will not be issued.
   3) Bidders will use complete sets of Bidding Documents in preparing bids and make certain that those submitting sub-bids to them have access to all portions of the documents that pertain to the work covered by sub-bid, including General Conditions, Supplementary Conditions, and Division 01. Bidder assumes full responsibility for errors or misinterpretations resulting from use of partial sets of Bidding Documents by itself or any sub-bidder.

B. Interpretation or Correction of Bidding Documents
   1) Bidders will request interpretation or correction of any apparent errors, discrepancies, and omissions in the Bidding Documents.
   2) Corrections or changes to Bidding Documents will be made by written addenda.

C. Substitutions and Equal Products
   1) Generally speaking, substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
   2) The terms *'Acceptable Manufacturers', 'Approved Manufacturers 'Suppliers', Installers'* and *'VMR (Value Managed Relationship) Manufacturers / Suppliers / Installers'* are used throughout the Project Manual to differentiate among the options available to Contractor regarding specified products, manufacturers, and suppliers. See Section 016000 for options available regarding acceptance of equal products.
   3) Base bid only on materials, equipment, systems, suppliers or performance qualities specified in the Bidding Documents.

4) Architect is only authorized to consider requests for approval of equal products to replace specified products in Sections where the heading '*Acceptable Manufacturers*' is used and statement, *'Equal as approved by Architect before bidding. See Section 016000'* or *'Equal as approved by Architect before installation. See Section 016000,'* appears. In Sections where the afore-mentioned statements do not appear and a different heading is used, Architect is authorized as Owner's representative to decline consideration of requests for approval of equal products. Approvals of equal products in such Sections must be made by Owner and will generally be for subsequent Projects.

D. Addenda - Addenda will be sent to bidders and to locations where Bidding Documents are on file no later than 2 business days prior to bid opening.

4. BIDDING PROCEDURES:

A. Form and Style of Bids
1) Use Owner's online bidding tool.
2) Fill in all blanks on online bidding tool. Signatures will be executed by representative of bidder duly authorized to make contracts.
3) Bids will bear no information other than that requested on bid form. Do not delete from or add to the information requested on the bid form.

B. Bid Security
1) If required, each bid will be accompanied by a bid bond naming Owner, as listed in the Agreement, as obligee. If Bidder refuses to enter into a Contract or fails to provide bonds and insurance required by the General Conditions, amount of bid security will be forfeited to Owner as liquidated damages, not as a penalty.
2) Bid bond will be issued by a surety company meeting requirements of the General Conditions for surety companies providing bonds and will be submitted on AIA Document A310, Bid Bond or AIA authorized equivalent provided by surety company. The attorney-in-fact who executes the bond on behalf of the surety will affix to the bond a certified and current copy of the power of attorney.
3) Owner may retain bid security of bidders to whom an award is being considered until -
a. Contract has been executed and bonds have been furnished,
b. Specified time has elapsed so bids may be withdrawn, or
c. All bids have been rejected.

C. Submission of Bids
1) Follow the instructions in the Owner's bidding tool when submitting your bid.
2) It is bidder's sole responsibility to see that its bid is received at specified time.
3) No oral, facsimile transmitted, telegraphic, or telephonic bids, modifications, or cancellations will be considered.

D. Modification or Withdrawal of Bid
1) Bidder guarantees there will be no revisions or withdrawal of bid amount for 45 days after bid opening.
2) Prior to bid opening, bidders may withdraw bid from Owner's bidding tool.

5. CONSIDERATION OF BIDS:

A. Opening of Bids - See Invitation to Bid.

B. Rejection of Bids - Owner reserves right to reject any or all bids and to waive any irregularity therein.

C. Acceptance of Bid
1) No bidder will consider itself under contract after opening and reading of bids until Agreement between Owner and Contractor is fully executed.
2) Bidder's past performance, organization, subcontractor selection, equipment, and ability to perform and complete its contract in manner and within time specified,

together with amount of bid, will be elements considered in award of contract.

6. POST-BID INFORMATION:

A. The conditionally accepted bidder submitting a bid involving subcontractors will submit its list of proposed subcontractors within 24 hours after bid opening.

7. PERFORMANCE BOND AND PAYMENT BOND:

A. Bond Requirements - Performance Bond and Labor and Material Payment bond may be required for this Project as specified in the General Conditions.

B. Time of Delivery of Bonds - Bonds will be delivered to Owner with Agreement signed by bidder.

8. FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR:

A. Agreement form will be “Agreement Between Owner and Contractor for a Fixed Sum (U.S.)”, “General Conditions Fixed Sum (U.S.)” and “Supplementary Conditions Fixed Sum (U.S.)”.

9. MISCELLANEOUS:

A. Pre-Bid Conference
   1) A pre-bid conference will be held at a time and place to be announced.

B. Liquidated Damages - Conditions governing liquidated damages are specified in the General Conditions and in the Supplementary Conditions.

C. Examination Schedule for Existing Building and Site
   1) Coordinate any site examination and access to the building outside of the Pre-Bid Conference with the FM Manager.

D. Exemption from local taxes - See Supplementary Conditions

END OF DOCUMENT

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INFORMATION AVAILABLE TO BIDDERS (U.S.)

1. GEOTECHNICAL DATA

A. Geotechnical Report -

1) No information provided for this project.

2. ASBESTOS-CONTAINING MATERIAL (ACM)

A. The building upon which work is being performed has been examined for asbestos-containing material.

B. Owner will provide a report to the Contractor to maintain on site during construction activities.

C. Refer to Section 01 3500, Article 1.3 “Environmental Procedures” for requirements to be followed.

END OF DOCUMENT

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SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

Project Name: Hooper Stake Cultural Hall Date: _____

Stake: Hooper UT Stake Project No: 502942823010101

General Contractor: _____

General Contractor is to provide the names of the following subcontractors and suppliers to the Owner's Project Manager immediately following the bid opening:

VMR SUBCONTRACTORS

Roofing _____

Other _____

Other _____

SUBCONTRACTORS AND SUPPLIERS

Demolition _____

Building Concrete _____

Masonry _____

Structural Steel _____

Framing _____

Insulation _____

Soffit / Fascia _____

Painting _____

HVAC _____

Electrical _____

B L A N K P A G E

EQUAL PRODUCT APPROVAL REQUEST FORM (U.S.)

Project Name: Hooper Stake Cultural Hall Request Number: _____

TO: _____

FROM: _____

BID DATE: _____

A proposed product is not legally approved and cannot legally be included in a bid or used in the Work until it appears in an Addendum or other Contract Modification as defined in the General Conditions. See Instructions To Bidders Paragraph 3.C, General Conditions, and Section 016000.

PROPOSED EQUAL PRODUCT:

Specification Section: _____

Specified Products: _____

Proposed Product: _____

The Undersigned certifies:

1. Proposed equal product has been fully investigated and determined to be equal or superior in all respects to specified products.
2. Same warranty will be furnished for proposed equal product as for specified products.
3. Same maintenance service and source of replacement parts, as applicable, is available.
4. Proposed equal product will have no adverse effect on other trades and will not affect or delay progress schedule.
5. Proposed equal product does not affect dimensions and functional clearances.

ATTACHMENTS:

Include the following attachments -

1. Copy of the Project Manual Section where the proposed equal product would be specified, rewritten or red-lined to include any changes necessary to correctly specify the proposed equal product. Identify completely changes necessary to the original Project Manual Section.
2. Copies of details, elevations, cross-sections, and other elements of the Project Drawings redone as necessary to show changes necessary to accommodate proposed equal product. Identify completely the changes from the original Drawings.
3. Complete product literature and technical data, installation and maintenance instructions, test results, and other information required to show complete conformance with requirements of the Contract Documents.

SIGNED: _____

Printed Name _____

Company _____

Address _____

City, State, Zip Code _____

Telephone _____ Fax _____

REVIEW COMMENTS:

_____ Accepted. See Addenda Number _____.

_____ Submission not in compliance with instructions. Respond to attached comments and resubmit.

_____ Proposed equal product not acceptable. Use specified products.

_____ Not Reviewed. Submission received too late. Use specified products.

ADDITIONAL COMMENTS:

BY: _____ **DATE:** _____

CONSTRUCTION MATERIAL ASBESTOS STATEMENT (U.S.)

PROJECTS FOR:
THE CHURCH OF JESUS CHRIST OF LATTER-DAY SAINTS,
a Utah corporation sole

Building Name: Hooper Stake cultural Hall

Building Plan Type: Non-Standard

Building Address: 6150 West 5600 South - Hooper, UT

Building Owner: The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole.

Project Number: 502942823010101

Completion Date:

As PROJECT CONSULTANT and principal in charge; based on my best knowledge, information, inspection, and belief; I certify that on the above referenced Project, no asbestos-containing building materials were specified in the construction documents or given approval in shop drawings or submittals.

Project Consultant and Principal in Charge (signature) Date

Company Name

As GENERAL CONTRACTOR in charge of construction; based on my best knowledge, information, inspection, and belief; I affirm that on the above-referenced Project, no asbestos-containing building materials were used in the construction.

General Contractor (signature) Date

Company Name

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AGREEMENT BETWEEN OWNER AND CONTRACTOR
FOR A FIXED SUM (U.S.)

The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole ("Owner") and _____ ("Contractor") hereby enter into this *Agreement Between Owner and Contractor for a Fixed Sum (U.S.)* ("Agreement") and agree as follows:

1. **Property/Project.**

   Property/Project Number:
   Property Address ("Project Site"):
   Project Type:
   Project Name ("Project"):
   Stake Name:

2. **Scope of the Work.** Contractor will furnish all labor, materials, equipment, construction, and services necessary to complete the Work in accordance with the Contract Documents.

3. **Contract Documents.**
   a. The Contract Documents consist of:
      1) This Agreement;
      2) The General Conditions for a Fixed Sum (U.S.), the Supplementary Conditions for a Fixed Sum (U.S.), and the Specifications (Divisions 01 through 49) contained in the Project Manual entitled _____, dated _____ and prepared by _____ ("Architect");
      3) The Drawings prepared by Architect entitled _____, sheet numbers _____, dated _____;
      4) Addendum No. _____ dated _____; and
      5) All Modifications to the Contract Documents.
   b. The Contract Documents are incorporated into this Agreement by reference as if fully set forth herein.
   c. The definitions set forth in the General Conditions for a Fixed Sum (U.S.) will apply to the Contract Documents.
   d. The Contract Documents contain the entire and integrated agreement between the parties hereto and supersede all prior negotiations, representations, or agreements, either written or oral.
   e. Modifications or other amendments to the Contract Documents must be in writing and as provided in the General Conditions for a Fixed Sum (U.S.).

4. **Time of Commencement and Substantial Completion.**
   a. Contractor will commence the Work on the date for commencement set forth in the Written Notice to proceed from Owner to Contractor.
   b. Contractor will achieve Substantial Completion and have the Work ready for Owner's inspection no later than _____ (_____) days from the date of commencement set forth in the Written Notice to proceed from Owner to Contractor, as adjusted in accordance with the Contract Documents.
   c. Time is of the essence.

5. **Contract Sum.**
   a. Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the Contract Sum in the amount of _____ Dollars ($_____), subject to additions and deductions as provided in the Contract Documents.
   b. Owner will make payments to Contractor in accordance with the Contract Documents.

6. **Independent Contractor Relationship.** Contractor is an independent contractor and is not the agent or employee of Owner.

7. **Assignment.** Neither party to this Agreement will assign any right or obligation hereunder without the prior written consent of the other, which consent may be granted or withheld in such party's absolute discretion. Contractor will not assign moneys due or to become due to Contractor hereunder, nor will Contractor pledge the credit of Owner or bind Owner to any third party.

8. **Notice.** The parties designate the addresses, facsimile numbers, and email addresses as set forth in the signature blocks below to be used for sending Written Notice to the other party:

9. **Effective Date.** The effective date of this Agreement is the date indicated by the Owner's signature.

OWNER:	**CONTRACTOR:**
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole	(company)
Signature:	Signature:
Print Name:	Print Name:
Title:	Title:
Address:	Address:
Telephone No:	Telephone No:
Facsimile No:	Facsimile No:
Email:	Email:
Effective Date:	Fed. I.D. or SSN:
	License No:
Reviewed By:	Date Signed:

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   Project Type:
   Project Name ("Project"):

   Stake Name:

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   a. The Contract Documents consist of:
      1) This Agreement;
      2) The General Conditions for a Fixed Sum (U.S.), the Supplementary Conditions for a Fixed Sum (U.S.), and the Specifications (Divisions 01 through 49) contained in the Project Manual entitled _____, dated _____ and prepared by _____ ("Architect");
      3) The Drawings prepared by Architect entitled _____, sheet numbers _____, dated _____;
      4) Addendum No. _____ dated _____; and
      5) All Modifications to the Contract Documents.
   b. The Contract Documents are incorporated into this Agreement by reference as if fully set forth herein.
   c. The definitions set forth in the General Conditions for a Fixed Sum (U.S.) will apply to the Contract Documents.
   d. The Contract Documents contain the entire and integrated agreement between the parties hereto and supersede all prior negotiations, representations, or agreements, either written or oral.
   e. Modifications or other amendments to the Contract Documents must be in writing and as provided in the General Conditions for a Fixed Sum (U.S.).

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   a. Contractor will commence the Work on the date for commencement set forth in the Written Notice to proceed from Owner to Contractor.
   b. Contractor will achieve Substantial Completion and have the Work ready for Owner's inspection no later than _____ (_____) days from the date of commencement set forth in the Written Notice to proceed from Owner to Contractor, as adjusted in accordance with the Contract Documents.
   c. Time is of the essence.

5. **Contract Sum.**
   a. Owner will pay Contractor for performance of Contractor's obligations under the Contract Documents the Contract Sum in the amount of _____ Dollars ($_____), subject to additions and deductions as provided in the Contract Documents.
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7. **Assignment.** Neither party to this Agreement will assign any right or obligation hereunder without the prior written consent of the other, which consent may be granted or withheld in such party's absolute discretion. Contractor will not assign moneys due or to become due to Contractor hereunder, nor will Contractor pledge the credit of Owner or bind Owner to any third party.

8. **Notice.** The parties designate the addresses, facsimile numbers, and email addresses as set forth in the signature blocks below to be used for sending Written Notice to the other party:

9. **Effective Date.** The effective date of this Agreement is the date indicated by the Owner's signature.

OWNER:	**CONTRACTOR:**
The Church of Jesus Christ of Latter-day Saints, a Utah corporation sole	(company)
Signature:	Signature:
Print Name:	Print Name:
Title:	Title:
Address:	Address:
Telephone No:	Telephone No:
Facsimile No:	Facsimile No:
Email:	Email:
Effective Date:	Fed. I.D. or SSN:
	License No:
Reviewed By:	Date Signed:

GENERAL CONDITIONS
For a Fixed Sum (U.S.)

TABLE OF CONTENTS

SECTION 1 - GENERAL PROVISIONS

1.1 DEFINITIONS

A. Adverse Weather: weather conditions that are seasonally abnormal and could not have been reasonably anticipated.

B. Agreement: the document entitled "Agreement Between Owner and Contractor for a Fixed Sum (U.S.), executed by Owner and Contractor for performance of the Work.

C. Architect: the entity identified as such in the Agreement.

D. Change In The Work: a modification to the requirements of the Contract Documents or a delay in Substantial Completion resulting from an instruction from Owner or Architect to Contractor or from another event or circumstance.

E. Change Order: a written instrument prepared by Architect and signed by Owner, Contractor, and Architect stating their agreement upon the following: (1) the occurrence of a Change in the Work; (2) the amount of the adjustment, if any, in the Contract Sum as a result of the Change in the Work; and (3) the extent of the adjustment, if any, in the Contract Time as a result of the Change in the Work.

F. Construction Change Directive: a written order prepared by Architect and signed by Architect and Owner which: (1) orders a Change in the Work if the terms of a Change Order cannot be agreed upon prior to performance of a Change in the Work described in Section 7.1 or after occurrence of an event or circumstance described in Section 7.2; and (2) states a proposed basis for adjustment, if any, in the Contract Sum, the Contract Time, or both, resulting from the Change in the Work.

G. Contract Documents: the documents identified as such in the Agreement.

H. Contract Sum: the total amount set forth in the Agreement payable by Owner to Contractor for performance of the Work.

I. Contract Time: the period of time set forth in the Agreement for the Substantial Completion of the Work.

J. Contractor: the entity identified as such in the Agreement.

K. Day: calendar day unless otherwise specifically defined.

L. Direct Costs: actual costs for labor, materials, equipment, insurance, bonds, subcontract costs and onsite supervision relating to the Project. They do not include labor costs for project managers or other off-site administration.

M. Drawings: the documents identified as such in the Agreement.

N. Field Change: a written order prepared by Architect and signed by Architect and Contractor for a minor Change in the Work consistent with the general intent of the Contract Documents costing $1,000 or less, resulting in no time extension, and which is necessary to avoid delaying the Work.

O. Modification: a written amendment to the Contract Documents in the form of a:
1. Change Order;
2. Construction Change Directive; or
3. Field Change.

P. Owner: the entity identified as such in the Agreement.

Q. Project: the total construction designed by Architect of which the Work performed under the Contract Documents may be the whole or a part.

R. Product Data: standard illustrations, schedules, performance charts, instructions, brochures, diagrams, and other information furnished by Contractor to illustrate details regarding materials or equipment to be used in the Work, or the manner of installation, operation, or maintenance of such materials or equipment.

S. Project Manual: the document identified as such in the Agreement.

T. Samples And Mock-ups: physical examples that illustrate materials, equipment, or workmanship and establish standards by which the Work will be judged.

U. Shop Drawings: drawings, diagrams, illustrations, schedules, performance charts, fabrication and installation drawings, setting diagrams, patterns, templates, and other data which illustrate some portion of the Work and confirm dimensions and conformance to the Contract Documents specially prepared by Contractor or any Subcontractor, manufacturer, supplier, or distributor.

V. Specifications: the documents identified as such in the Agreement.

W. Subcontractor: any entity supplying labor, materials, equipment, construction or services for the Work under separate contract with Contractor or any other Subcontractor.

X, Submittals: Shop Drawings, Product Data, Samples and Mock-ups and any other documents or items furnished by Contractor or its Subcontractors to Owner or Architect to demonstrate how any portion of the Work will be accomplished or the type of materials or products that will be used in the Work.

Y. Substantial Completion: Completion of the Work to a point where Owner can use the Work for its intended purposes. The date of Substantial Completion is the date certified as such by Architect in accordance with the Contract Documents.

Z. Work: all labor, materials, equipment, construction, and services required by the Contract Documents.

AA. Written Notice: notice in writing given from one party to the other at the addresses or facsimile numbers listed in the Agreement, or at such other addresses or facsimile numbers as the parties will designate from time to time by Written Notice, and will be effective at the earliest of:
1. The date of personal delivery to the other party with signed acknowledgment of receipt; or
2. The date sent by facsimile transmission to the other party provided receipt of the facsimile is verified by an electronic confirmation report by the party sending the facsimile transmission and further provided that a confirmation copy is sent to the other party by courier or by registered or certified mail within twenty-four (24) hours after the time and date of the facsimile transmission; or
3. The date of receipt by the other party as stated on the return receipt if sent by registered or certified mail, or by courier.

1.2 CORRELATION AND INTENT OF CONTRACT DOCUMENTS

A. The intent of the Contract Documents is to require Contractor to provide all labor, materials, equipment, construction, and services necessary for the proper execution and completion of the Work. The Contract Documents are complementary and what is required by any one will be as binding as if required by all. Contractor will perform the Work in accordance with the requirements expressly set forth in or reasonably inferable from the Contract Documents.

B. The organization of the Contract Documents is not intended to control Contractor in dividing the Work among Subcontractors or to establish the extent of the Work to be performed by any trade.

C. Words used in the Contract Documents that have well known technical or trade meanings are used therein in accordance with such recognized meanings.

D. In the interest of brevity, the Contract Documents may 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.

1.3 OWNERSHIP AND USE OF CONTRACT DOCUMENTS

The Drawings, the Project Manual, and copies thereof are the property of Owner. Contractor will not use these documents on any other project. Contractor may retain one copy of the Drawings and the Project Manual as a contract record set and will return or destroy all remaining copies following final completion of the Work.

1.4 PUBLIC STATEMENTS REGARDING PROJECT

Contractor will not make any statements or provide any information to the media about the Project without the prior written consent of Owner. If Contractor receives any requests for information from media, Contractor will refer such requests to Owner.

1.5 OWNERSHIP AND USE OF RENDERINGS AND PHOTOGRAPHS

Renderings representing the Work are the property of Owner. All photographs of the Work, whether taken during performance of the Work or at completion, are the property of the Owner. The Owner reserves all rights including copyrights to renderings and photographs of the Work. No renderings or photographs shall be used or distributed without written consent of the Owner

1.6 NO COMMERCIAL USE OF TRANSACTION OR RELATIONSHIP

Without the prior written consent of Owner, which Owner may grant or withhold in its sole discretion, neither Contractor nor Contractor's affiliates, officers, directors, agents, representatives, shareholders, members, Subcontractors, Sub-subcontractors or employees shall make any private commercial use of their relationship to Owner or the Project, including, without limitation:

A. By referring to this Agreement, Owner, or the Project verbally or in any sales, marketing or other literature, letters, client lists, press releases, brochures or other written materials except as may be necessary for Contractor to perform Contractor's obligations under the terms of this Agreement;

B. By using or allowing the use of any photographs of the Project or any part thereof, or of any service marks, trademarks or trade names or other intellectual property now or which may hereafter be associated with, owned by or licensed by Owner in connection with any service or product; or

C. By contracting with or receiving money or anything of value from any person or commercial entity to facilitate such person or entity obtaining any type of commercial identification, advertising or visibility in connection with the Project.

Notwithstanding the foregoing, Contractor may include a reference to Owner and the services and equipment provided under this Agreement in a professional résumé or other similar listing of Contractor's references without seeking Owner's written consent in each instance; provided, that such reference to Owner, the services and equipment is included with at least several other similar references and is given no more prominence than such other references.

1.7 CONFIDENTIALITY / PROPERTY RIGHTS

A. Owner will retain ownership and intellectual property rights in all plans, designs, drawings, documents, concepts, and materials provided by or on behalf of Owner to Contractor and to all work products of Contractor for or relative to Work performed under this Agreement, such products, services, and Work of Contractor constituting works made for hire. Contractor will not reuse any portions of such items provided by Owner or developed by Contractor for Owner pursuant to this Agreement, or disclose any such items to any third party without the prior written consent of Owner. Owner may withhold its consent in its' absolute discretion.

B. In addition, Contractor shall ensure that Contractor, Subcontractors, and the employees, agents and representatives of Contractor and its Subcontractors maintain in strict confidence, and shall use and disclose only as authorized by Owner all Confidential Information of Owner that Contractor receives in connection with the performance of this Agreement. Notwithstanding the foregoing, Contractor may use and disclose any information to the extent required by an order of any court or governmental authority, but only after it has notified Owner and Owner has had an opportunity to obtain reasonable protection for such information in connection with such disclosure. For purposes of this Agreement, "Confidential Information" means:
   1. The name or address of any affiliate, customer or contractor of Owner or any information concerning the transactions of any such person with Owner;
   2. Any information relating to contracts, agreements, business plans, budgets or other financial information of Owner to the extent such information has not been made available to the public by the Owner; and
   3. Any other information that is marked or noted as confidential by the Owner at the time of its disclosure.

1.8 COMPLY WITH INTELLECTUAL PROPERTY RIGHTS OF OTHERS

Contractor represents and warrants that no Work (with its means, methods, goods, and services attendant thereto), provided to Owner will infringe or violate any right of any third party and that Owner may use and exploit such Work, means, methods, goods, and services without liability or obligation to any person or entity (specifically and without limitation, such Work, means, methods, goods, and services will not violate rights under any patent, copyright, trademark, or other intellectual property right or application for the same).

SECTION 2 - OWNER

2.1 OWNER'S DESIGNATED REPRESENTATIVE

Owner will designate in writing a representative who will have express authority to bind Owner with respect to all matters requiring Owner's approval or authorization.

2.2 INFORMATION AND SERVICES REQUIRED OF OWNER

A. Owner will be responsible for establishment of property lines and benchmarks for grading.

B. Owner will furnish to Contractor any information or services it is required to furnish under the Contract Documents with reasonable promptness to avoid delay in the orderly progress of the Work.

C. Owner will furnish to Contractor a reasonable number of copies of the Drawings, the Project Manual, and the Addenda.

2.3 OWNER'S RIGHT TO INSPECT THE WORK

Owner and its representatives will have the right to inspect any portion of the Work wherever located at any time.

2.4 OWNER'S RIGHT TO STOP THE WORK

If Contractor fails to carry out the Work in accordance with the Contract Documents or fails to correct Work which is not in accordance with the Contract Documents in a timely manner, Owner may order Contractor in writing to stop the Work, or any portion thereof, until the cause for that order has been eliminated.

SECTION 3 - CONTRACTOR

3.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

A. By executing the Agreement, Contractor represents that it has visited the Project site, familiarized itself with the local conditions under which the Work is to be performed, and correlated its own observations with the requirements of the Contract Documents.

B. Contractor will carefully review and compare the Contract Documents and any other available information relating to the Project prior to commencing and during performance of each portion of the Work and will immediately report to Architect any errors, inconsistencies, and omissions it discovers.

C. Should Contractor or any of its Subcontractors become aware of any question regarding the meaning or intent of any part of the Contract Documents prior to commencing that portion of the Work about which there is a question, Contractor will request an interpretation or clarification from Architect before proceeding. Contractor proceeds at its own risk if it proceeds with the Work without first making such a request and receiving an interpretation or clarification from Architect. If neither Contractor nor its Subcontractors become aware of the question until after work on the relevant portion of the Work has commenced, then the following precedence will govern for purposes of determining whether resolution of the question constitutes a Change in the Work:
   1. The Agreement takes precedence over all other Contract Documents.
   2. The Supplementary Conditions take precedence over the General Conditions.
   3. The General Conditions and Supplementary Conditions take precedence over the Drawings and the Specifications.
   4. An Addendum or a Modification takes precedence over the document(s) modified by the Addendum or Modification.
   5. The Specifications take precedence over the Drawings.
   6. Within the Drawings, larger scale drawings take precedence over smaller scale drawings, figured dimensions over scaled dimensions, and noted materials over graphic indications.

D. Contractor will give Architect notice of any additional drawings, specifications, or instructions required to define the Work in greater detail, or to permit the proper progress of the Work, sufficiently in advance of the need for information so as not to delay the Work.

E. It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with requirements of applicable laws, statutes, ordinances, building codes, rules and regulations. However, if Contractor observes that portions of the Contract Documents are at variance with those requirements, Contractor will immediately notify Architect in writing. Contractor will not proceed unless Owner and/or Architect effects Modifications to the Contract Documents required for compliance with such requirements. Contractor will be fully responsible for any work knowingly performed contrary to such requirements and will fully indemnify Owner against loss and bear all costs and penalties arising therefrom.

F. Contractor will take field measurements and verify field conditions and will compare such field measurements and conditions and other information known to Contractor with the Contract Documents before ordering any materials or commencing construction activities. Contractor will immediately report errors, inconsistencies, and omissions that it discovers to Architect. If Contractor orders materials or commences construction activities before taking field measurements and verifying field conditions, Contractor will not be entitled to any compensation for additional costs to Contractor resulting from field measurements or conditions different from those anticipated by Contractor which would have been avoided had Contractor taken field measurements and verified field conditions prior to ordering the materials or commencing construction activities.

G. If site conditions indicated in the Contract Documents or other information provided by Owner or Architect to Contractor differ materially from those Contractor encounters in performance of the Work, Contractor will immediately notify Architect in writing of such differing site conditions.

H. Where the Contract Documents require the Contractor to provide professional services for architecture or engineering, the Contractor shall cause such services to be performed by appropriately licensed professionals.

3.2 SUPERVISION OF CONSTRUCTION PROCEDURES

A. Contractor will supervise and direct the Work. Contractor will be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work. All loss, damage, liability, or cost of correcting defective work arising from the use of any construction means, methods, techniques, sequences or procedures will be borne by Contractor, notwithstanding that such construction means, methods, techniques, sequences or procedures are referred to, indicated or implied by the Contract Documents, unless Contractor has given timely notice to Owner and Architect in writing that such means, methods, techniques, sequences or procedures are not safe or suitable, and Owner has then instructed Contractor in writing to proceed at Owner’s risk.

B. Contractor will utilize its best skill, efforts, and judgment to provide 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 interests of Owner.

C. Contractor will be responsible for:
   1. The proper observance of property lines and set back requirements as shown in the Contract Documents;

2. The location and layout of the Work as shown in the Contract Documents with respect to the position of the Work on the property and the elevation of the Work in relation to grade; and
3. Setting and maintaining construction stakes.

D. Contractor will be responsible to Owner for the acts and omissions of its employees and Subcontractors as well as persons either directly or indirectly employed by Subcontractors.

E. Contractor will not be relieved of its obligation to perform the Work in accordance with the Contract Documents as a result of any tests, inspections, or approvals by Owner, Architect or their consultants.

F. Contractor will be responsible for inspection of portions of the Work already completed to determine that such portions are in proper condition to receive subsequent portions of the Work.

G. Contractor recognizes that the Project site and the surrounding area is frequently visited by the public and is important to Owner's image and function and will maintain the premises free from debris and waste materials resulting from Construction. At the completion of Construction, Contractor shall promptly remove construction equipment, tools, surplus materials, waste materials and debris.

3.3 LABOR AND MATERIALS

A. Unless otherwise provided in the Contract Documents, Contractor will provide and pay for all labor, materials, equipment, tools, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work.

B. Contractor will at all times enforce strict discipline and good order among those performing the Work and will not permit employment of any unfit person or anyone not skilled in the tasks assigned to them.

C. Contractor is fully responsible for the Project and all materials and work connected therewith until Owner has accepted the Work in writing. Contractor will replace or repair at its own expense any materials or work damaged or stolen, regardless of whether it has received payment for such work or materials from the Owner.

D. Contractor will remedy all damage or loss to any property caused in whole or in part by Contractor, any Subcontractor, or by anyone for whose acts any of them may be liable.

E. Contractor will be responsible for determining that all materials furnished for the Work meet all requirements of the Contract Documents. Architect may require Contractor to produce reasonable evidence that a material meets such requirements, such as certified reports of past tests by qualified testing laboratories, reports of studies by qualified experts, or other evidence which, in the opinion of Architect, would lead to a reasonable certainty that any material used, or proposed to be used, in the work meets the requirements of the Contract Documents. All such data will be furnished at Contractor's expense. This provision will not require Contractor to pay for periodic testing of different batches of the same material, unless such testing is specifically required by the Contract Documents to be performed at Contractor's expense.

F. Contractor will coordinate and supervise the work performed by Subcontractors so that the Work is carried out without conflict between trades and so that no trade, at any time, causes delay to the general progress of the Work. Contractor and all Subcontractors will at all times afford each trade, any separate contractor, or Owner, reasonable opportunity for the installation of Work and the storage of materials.

G. Contractor warrants to Owner that the materials and equipment furnished for the Work will be new unless otherwise specified by the Contract Documents, and that the Work will be free from defects, and will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective in the discretion of Owner. If required by Architect, Contractor will furnish satisfactory evidence as to the kind and quality of the materials and equipment used in performing the Work.

H. Owner may elect to purchase materials required for the Work. In that event, Contractor will comply with the procedures set forth in the Contract Documents relating to such materials.

3.4 COMPLIANCE WITH LAWS

Contractor will comply with all applicable laws, ordinances, rules, regulations, and orders of any public authorities relating to performance of the Work.

3.5 TAXES

A. Contractor will pay all sales, use, consumer, payroll, workers compensation, unemployment, old age pension, surtax, and similar taxes assessed in connection with the performance of the Work.

B. Owner will pay all taxes and assessments on the real property comprising the Project site.

3.6 PERMITS AND FEES

A. Owner will obtain and pay for all zoning and use permits and permanent easements necessary for completion of the Work.

B. Contractor will obtain and pay for the building permit, and all other permits, governmental fees, licenses and inspections necessary for the proper execution and completion of the Work.

C. Contractor will secure any certificates of inspection and of occupancy required by authorities having jurisdiction over the Work. Contractor will deliver these certificates to Architect prior to issuance of the Certificate of Substantial Completion by Architect.

3.7 CONTRACTOR'S ON-SITE REPRESENTATIVE

Contractor will employ a competent representative acceptable to Owner to supervise the performance of the Work. This representative will be designated in writing by Contractor prior to commencement of work and will not be changed prior to final inspection of the Work without prior written consent of Owner. This representative will represent Contractor for all purposes, including communication with Owner.

3.8 CONTRACTOR'S CONSTRUCTION SCHEDULES

A. Contractor will prepare and submit for Owner's and Architect's information Contractor's construction schedule for the Work in accordance with the requirements of the Contract Documents.

B. Contractor will prepare and maintain a Submittal schedule which is coordinated with Contractor's construction schedule and sets forth specified times for Architect to review Submittals.

3.9 DOCUMENTS AND SUBMITTALS AT THE SITE

Contractor will keep at the Project site for use by Owner, Architect, or their representatives, a record copy of the Project Manual, the Drawings, all Addenda, and all Modifications. These documents will be maintained in good order and currently marked to record changes and selections made during construction. In addition, Contractor will keep at the Project site one copy of all Submittals.

3.10 SUBMITTALS

A. Submittals are not Contract Documents and do not alter the requirements of the Contract Documents unless incorporated into the Contract Documents by a Modification.

B. Contractor will review, approve, and submit to Architect Submittals in accordance with the Contract Documents. By approving Submittals, Contractor represents that it has determined and verified field measurements, field construction criteria, materials, catalog numbers, and similar data, and that it has checked and coordinated each Submittal with the requirements of the Work and of the Contract Documents or will make such determination, verification, check, and coordination prior to commencing the relevant portion of the Work. In reviewing Submittals Architect will be entitled to rely upon Contractor’s representation that such information is correct and accurate.

C. Contractor will inform Architect in writing at the time of submission of any Submittal or portion thereof which deviates from the requirements of the Contract Documents. Contractor will provide Architect with documentation demonstrating to Architect that the Submittal is equal to or better than the specified product or work. Contractor will not be relieved of responsibility for deviations from the requirements of the Contract Documents by Architect’s acceptance of a Submittal unless Contractor has informed Architect in writing of the deviation and Architect has incorporated the deviation into the Contract Documents by a Modification.

D. Contractor will not perform any portions of the Work requiring Submittals until the respective Submittal has been reviewed and accepted in writing by Architect.

E. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, Owner will be entitled to rely upon such certifications, and neither Owner nor Architect will be expected to make any independent examination with respect thereto.

F. Submittals not required by the Contract Documents may be returned to Contractor without action.

3.11 CUTTING AND PATCHING

Contractor will be responsible for any cutting, fitting, and patching that may be required to complete the Work and make its parts fit together properly.

3.12 ACCESS TO WORK

Contractor will permit Owner, Architect, their representatives and consultants, access to the Work wherever located at any time.

3.13 ROYALTIES AND PATENTS

Contractor will pay all royalties and license fees required by the Work or by Contractor's chosen method of performing the Work. Contractor will defend and hold Owner harmless from all suits or claims for infringement of any patent, license or other intellectual property rights or any loss on account thereof.

3.14 INDEMNIFICATION

A. Contractor will indemnify and hold harmless Owner and Owner's representatives, employees, agents, architects, and consultants from and against any and all claims, damages, liability, demands, costs, judgments, awards, settlements, causes of action, losses and expenses (collectively “Claims” or “Claim”), including but not limited to attorney fees, consultant fees, expert fees, copy costs, and other expenses, arising out of or resulting from performance of the Work, attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of real or personal property, including loss of use resulting therefrom, except to the extent that such liability arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity includes, without limitation, indemnification of Owner from all losses or injury to Owner’s property, except to the extent that such loss or injury arises out of the negligence of Owner, its representatives, agents, and employees. This indemnity applies, without limitation, to include Claims occurring both during performance of the Work and/or subsequent to completion of the Work. In the event that any Claim is caused in part by a party indemnified hereunder, that party will bear the cost of such Claim to the extent it was the cause thereof. In the event that a claimant asserts a Claim for recovery against any party indemnified hereunder, the party indemnified hereunder may tender the defense of such Claim to Contractor. If Contractor rejects such tender of defense and it is later determined that the negligence of the party indemnified hereunder did not cause all of the Claim, Contractor will reimburse the party indemnified hereunder for all costs and expenses incurred by that party in defending against the Claim. Contractor will not be liable hereunder to indemnify any party for damages resulting from the sole negligence of that party.

B. In addition to the foregoing, Contractor will be liable to defend Owner in any lawsuit filed by any Subcontractor relating to the Project. Where liens have been filed against Owner's property, Contractor (and/or its bonding company which has issued bonds for the Project) will obtain lien releases and record them in the appropriate county and/or local jurisdiction and provide Owner with a title free and clear from any liens of Subcontractors. In the event that Contractor and/or its bonding company are unable to obtain a lien release, Owner in its absolute discretion may require Contractor to provide a bond around the lien or a bond to discharge the lien, at Contractor's sole expense.

C. In addition to the foregoing, Contractor will indemnify and hold Owner harmless from any claim of any other contractor resulting from the performance, nonperformance or delay in performance of the Work by Contractor.

D. The indemnification obligation herein will not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or a Subcontractor under worker's compensation acts, disability benefit acts, or other employee benefit acts.

3.15 PROJECT MEETINGS

Contractor will attend and participate in meetings as required by the Contract Documents.

SECTION 4 - ADMINISTRATION OF THE CONTRACT

4.1 ARCHITECT

In the event that Owner terminates its contractual relationship with Architect, Owner will appoint in writing another architect, whose status under the Contract Documents will be that of the former Architect in all respects.

4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT

A. Architect will make periodic visits to the site to familiarize itself generally with the progress and quality of the Work and to determine if the Work is proceeding in accordance with the Contract Documents. Although Architect is required to make periodic inspections, it is not required to make exhaustive or continuous onsite inspections. On the basis of its observations while at the site, Architect will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work. Architect’s failure to observe a defect or deficiency in the Work will not relieve Contractor of its duty to perform the Work in accordance with the Contract Documents.

B. Architect will review Contractor's payment requests and determine the amounts due Contractor in accordance with Section 9.

C. Communications between Contractor and Owner relating to the Work will be through Architect. Communications between Owner or Contractor with Architect’s consultants relating to the Work will be through Architect. Communications between Owner or Architect and subcontractors relating to the Work will be through Contractor. Communications between Contractor and any separate contractor will be through Architect, except as otherwise specified in the Contract Documents.

D. Owner and/or Architect will have the right to reject and require removal of the following at Contractor's expense:
   1. Any portion of the Work that does not meet the requirements of the Contract Documents.
   2. Any portion of the Work damaged or rendered unsuitable during installation or resulting from failure to exercise proper protection.

E. Architect will have authority to suspend the Work, with concurrence of Owner, whenever such suspension may be necessary in its reasonable opinion to insure the proper performance of the Work.

F. Architect will review Contractor’s Submittals and will accept or take other appropriate action regarding the Submittals. Architect's review of the Submittals will be for the limited purpose of checking for general conformance with the Contract Documents and will not be conducted for the purpose of determining the accuracy and completeness of 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 Contractor. Architect's review of Submittals will not relieve Contractor of its obligations under the Contract Documents. Architect's review of Submittals will not constitute acceptance of safety precautions or construction

means, methods, techniques, sequences or procedures. Architect's acceptance of a specific item will not indicate acceptance of an assembly of which the item is a component.

G. Architect has authority to order Construction Change Directives and Field Changes in accordance with Section 7.

H. Architect will conduct inspections to determine the dates of Substantial Completion and final completion, will receive and review written guarantees and related documents required by the Contract and assembled by Contractor, and will review and certify or reject Contractor's final payment request.

I. Architect will be the interpreter of the performance and requirements of the Contract Documents. Architect's interpretations will be in writing or in the form of drawings.

J. Architect's decisions in matters relating to aesthetic effect will be final if consistent with the Contract Documents and approved by Owner.

SECTION 5 - SUBCONTRACTORS

5.1 AWARD OF SUBCONTRACTS FOR PORTIONS OF THE WORK

A. Contractor will enter into contracts with Subcontractors to perform all portions of the Work that Contractor does not customarily perform with its own employees.

B. Contractor will not contract with any Subcontractor who has been rejected by Owner. Contractor will not be required to contract with any Subcontractor against whom it has a reasonable objection.

C. If Owner rejects any Subcontractor proposed by Contractor, Contractor will propose an acceptable substitute to whom Owner has no reasonable objection.

D. Contractor will not make any substitution for any Subcontractor that has been accepted by Owner and Architect without the prior written approval of Owner and Architect.

5.2 SUBCONTRACTUAL RELATIONS

A. Contractor's responsibility for the Work includes the labor and materials of all Subcontractors, including those recommended or approved by Owner. Contractor will be responsible to Owner for proper completion and guarantee of all workmanship and materials under any subcontracts. Any warranties required for such work will be obtained by Contractor in favor of Owner and delivered to Architect. It is expressly understood and agreed that there is no contractual relationship between Owner and any Subcontractor, and under no circumstances will Owner be responsible for the non-performance or financial failure of any Subcontractor or any effects therefrom.

B. Contractor agrees to pay the Subcontractors promptly upon receipt of payment from Owner for that portion of the funds received which represents the Subcontractor's portion of the Work completed to Contractor's satisfaction for which Owner has made payment.

C. Contractor will require each Subcontractor to:
1. Be licensed by the state in which the Project is located where such licensing is required by the governing authority;
2. Be bound by the terms of the Contract Documents as far as they are applicable to the Subcontractor's work;
3. Assume toward Contractor the same obligations Contractor has assumed toward Owner, including the prompt payment of its Subcontractors;
4. Submit its applications for payment to Contractor in time to permit Contractor to make timely application to Owner;
5. Execute claim or lien releases or lien waivers for payments made by Contractor; and
6. Make all claims for Changes in the Work to Contractor in the same manner as Contractor is required to make such claims to Owner.

SECTION 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM WORK OR AWARD SEPARATE CONTRACTS

A. Owner reserves the right to perform work itself or to award separate contracts in connection with the Project.

B. When separate contracts are awarded, "Contractor" in the Contract Documents in each case will mean the contractor who signs each separate contract.

6.2 MUTUAL RESPONSIBILITY

A. Contractor will afford other contractors reasonable opportunity to place and store their materials and equipment on site and to perform their work and will properly connect and coordinate its Work with theirs where applicable.

B. If any part of Contractor's Work depends upon the work of any separate contractor for proper performance or results, Contractor will inspect and promptly report to Architect any apparent discrepancies or defects in such work that render it unsuitable for

proper performance and results. Failure of Contractor to so inspect and report will constitute an acceptance of the work of the separate contractor as fit and proper to receive Contractor's Work, except as to defects not then reasonably discoverable.

C. Contractor will promptly remedy damage caused by Contractor or any Subcontractor to the completed or partially completed work of other contractors or to the property of Owner or other contractors.

6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among Contractor and separate contractors as to the responsibility under their separate contracts for maintaining the Project free from waste materials and rubbish, Owner may clean the Project, allocate the cost among those responsible as Owner and Architect determine to be just, and withhold such cost from any amounts due or to become due to Contractor.

SECTION 7 - CHANGES IN THE WORK

7.1 CHANGES IN THE WORK RESULTING FROM AN INSTRUCTION BY OWNER OR ARCHITECT TO CONTRACTOR

A. If Owner or Architect gives Contractor an instruction that modifies the requirements of the Contract Documents or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If compliance with the instruction affects the cost to Contractor to perform the Work, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in cost subject to the conditions set forth in Section 7.1, Paragraphs B through G. If compliance with the instruction delays Substantial Completion, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in Section 7.1, Paragraphs B through G and Section 7.3, Paragraph A and Contractor will be paid liquidated damages for the delay as set forth in Section 7.3, Paragraph B.

B. If Contractor receives an instruction from Owner or Architect that Contractor considers to be a Change in the Work, Contractor, before complying with the instruction, will notify Architect in writing that Contractor considers such instruction to constitute a Change in the Work. If Architect agrees that compliance with the instruction will constitute a Change in the Work, Contractor will furnish a proposal for a Modification in accordance with Section 7.1, Paragraphs C. and D. within ten (10) days.

C. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) as a result of an instruction by Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown itemized as required by Owner. The breakdown will be in sufficient detail to allow Owner to determine any increase or decrease in Direct Costs as a result of compliance with the instruction. Any amount claimed for subcontracts will be supported by a similar price breakdown and will itemize the Subcontractor’s profit and overhead charges. Profit and overhead will be subject to the following limitations:
   1. The Subcontractor’s profit and overhead will not exceed ten (10) percent of its Direct Costs on work performed. Subcontractor’s profit and overhead will not exceed five (5) percent on work performed by its sub-subcontractors.
   2. Contractor's profit and overhead on work performed by its own crews will not exceed ten (10) percent of its Direct Costs.
   3. Contractor's profit and overhead mark up on work performed by its Subcontractors will not exceed five (5) percent of the Subcontractors’ charges for such work.
   4. Amounts due Owner as a result of a credit change will be the actual net savings to Contractor from the Change in the Work as confirmed by Architect. On credit changes, profit and overhead on the originally estimated work will not be credited back to Owner. If both additions and credits are involved in a single Change in the Work, overhead and profit will be figured on the basis of net increase, if any, related to that Change in the Work.

D. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an instruction from Owner or Architect, Contractor will include in its proposal justification to support Contractor's claim that compliance with the instruction will delay Substantial Completion.

E. Upon receipt of Contractor’s proposal for Modification, Architect and Owner will determine whether to proceed with the Change in the Work. If Architect and Owner determine to proceed with the Change in the Work, they will issue a Change Order, a Construction Change Directive or a Field Change as appropriate.

F. Contractor agrees that if it complies with an instruction from Owner or Architect without first giving written notice to Architect as provided in Section 7.1., Paragraph B, and receiving a Change Order, Construction Change Directive or Field Change, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.

G. If Contractor is instructed to perform work which it claims constitutes a Change in the Work but which Owner and Architect do not agree constitutes a Change in the Work, Contractor will comply with the instruction. Contractor may submit its claim for adjustment to the Contract Sum, the Contract Time, or both as a dispute pursuant to Section 13 within thirty (30) days after compliance with the instruction. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days after compliance with the instruction, then Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time as a result of the instruction and waives any claim therefor.

H. Contractor agrees that it is responsible for submitting accurate cost and pricing data to support its Change Order Proposals. Owner will have the right to examine the Contractor’s records to verify the accuracy and appropriateness of the pricing data used to price change order proposals.

7.2 CHANGE IN THE WORK RESULTING FROM AN EVENT OR CIRCUMSTANCE

A. If an event or circumstance other than an instruction from Owner or Architect affects the cost to Contractor of performing the Work or delays Substantial Completion, Contractor may be entitled to an adjustment in the Contract Sum and/or the Contract Time. If the circumstance or event affects the cost to Contractor to perform the Work and is caused by a willful or negligent act or omission of Owner or Architect, the Contract Sum will be adjusted to reflect the reasonable increase or decrease in Contractor's cost to perform the Work resulting from the event or circumstance, subject to the conditions set forth in Section 7.2, Paragraphs B through F. If the event or circumstance delays Substantial Completion and is described in Section 7.3, Paragraph A, the Contract Time will be extended for a period of time commensurate with such delay subject to the conditions set forth in such section. If the circumstance or event delays Substantial Completion and is caused by a willful or negligent act or omission of Owner or Architect, then Contractor will be compensated for costs incident to the delay in accordance with Section 7.3, Paragraph B. Contractor will not be entitled to any adjustment to the Contract Sum or other damages from Owner as a result of any event or circumstance unless the event or circumstance results from a willful or negligent act or omission of Owner or Architect.

B. If a Change in the Work results from any event or circumstance caused by the willful or negligent act or omission of Owner or Architect, Contractor will give Owner Written Notice of such event or circumstance within twenty-four (24) hours after commencement of the event or circumstance so that Owner can take such action as is necessary to mitigate the effect of the event or circumstance. Contractor will not be entitled to any adjustment in either the Contract Time or the Contract Sum based on any damages or delays resulting from such event or circumstance during a period more than twenty-four (24) hours prior to Contractor giving such Written Notice to Owner.

C. Contractor will submit in writing any claims for an adjustment in the Contract Time and/or the Contract Sum resulting from an event or circumstance within the time limits set forth below. In the event that Contractor fails to submit its claim in writing within the time limits set forth below, then Contractor agrees it will not be entitled to any adjustment in the Contract Time or the Contract Sum or to any other damages from Owner due to the circumstance or event and waives any claim therefor.
   1. Claims for an adjustment in the Contract Time due to Adverse Weather will be made by the tenth (10th) of the month following the month in which the delay occurred.
   2. Claims for an adjustment in the Contract Time and/or the Contract Sum due to any other circumstance or event will be submitted within seven (7) days after the occurrence of the circumstance or event.

D. If Contractor claims that it is entitled to an adjustment in the Contract Sum (including without limitation costs related to a time extension) because of an event or circumstance resulting from the willful or negligent act or omission of Owner or Architect, Contractor will furnish a proposal for a Change Order containing a price breakdown as described in Section 7.1, Paragraph C. Any amount claimed for increased labor costs as a result of the event or circumstance must be supported by a certified payroll. Any claim for rented equipment or additional material costs must be supported by invoices.

E. If Contractor claims that it is entitled to an adjustment in the Contract Time as a result of an event or circumstance, Contractor will include with its claim copies of daily logs, letters, shipping orders, delivery tickets, Project schedules, and other supporting information necessary to justify Contractor's claim that the event or circumstance delayed Substantial Completion. If Contractor is entitled to an adjustment in the Contract Time as a result of an event or circumstance caused by the wilful or negligent act or omission of Owner or Architect, Contractor will be compensated for all costs related to the delay in accordance with Section 7.3, Paragraph B.

F. Within thirty (30) days after receipt of Contractor's claim, Architect will either deny the claim or recommend approval to Owner. If Owner approves the claim, the adjustment in the Contract Time and/or Contract Sum will be reflected in a Change Order pursuant to Section 7.5 or a Construction Change Directive pursuant to Section 7.6. If Owner or Architect denies Contractor's claim, Contractor may submit its claim as a dispute pursuant to Section 13 within thirty (30) days of receipt of the denial of the claim. If Contractor fails to submit its claim for resolution pursuant to Section 13 within the thirty (30) day time period, then Contractor agrees it is not entitled to any adjustment in the Contract Time and/ or Contract Sum or any other damages as a result of the event or circumstance and waives any claim therefor.

7.3 EXTENSIONS OF TIME

A. If Substantial Completion of the Project is delayed because of any of the following causes, then the Contract Time will be extended by Change Order for a period of time equal to such delay:
   1. Labor strikes or lock-outs;
   2. Adverse weather;
   3. Unusual delay in transportation;
   4. Unforeseen governmental requests or requirements;
   5. A Change in the Work resulting from an instruction by Owner or Architect to Contractor subject to the conditions set forth in Section 7.1; or
   6. Any other event or circumstance caused by the willful or negligent act or omission of Owner or Architect.

B. Contractor will not be entitled to any compensation for delay described in Section 7.3, Paragraph A, subparagraphs 1, 2, 3 and 4. For each day of delay in Substantial Completion described in Section 7.3, Paragraph A, subparagraphs 5 and 6, Contractor will be paid liquidated damages in the amount per day set forth in the Supplementary Conditions to compensate Contractor for all damages resulting from any delay including but not limited to damages for general conditions costs, additional job site costs, additional home office overhead costs, disruption costs, acceleration costs, increase in labor costs, increase in subcontract costs, increase in materials costs, and any other costs incident to the delay. Contractor will be entitled to no other compensation relating to the delay.

C. In no event will any time extension or cost adjustment be given on account of delay which reasonably should have been anticipated by the Contractor or in circumstances where performance of the Work is, was, or would have been, delayed by any other cause for which the Contractor is not entitled to an extension.

7.4 DOCUMENTATION OF CHANGES IN THE WORK

Every Change in the Work will be documented by a Change Order, a Construction Change Directive or a Field Change. If Owner, Architect and Contractor reach agreement regarding the adjustment in the Contract Sum, if any, and the adjustment in the Contract Time, if any, resulting from a Change in the Work, then the parties will execute a Change Order pursuant to Section 7.5. If Owner, Architect and Contractor cannot reach agreement regarding the adjustment in Contract Sum or the adjustment in Contract Time resulting from a Change in the Work, then Owner and Architect will issue a Construction Change Directive pursuant to Section 7.6. Field Changes require the agreement of Architect and Contractor only.

7.5 CHANGE ORDERS

Contractor's signature upon a Change Order is Contractor's acknowledgment that it is not entitled to any additional adjustment in the Contract Sum or the Contract Time or any other damages or compensation as a result of the Change in the Work other than that provided for in the Change Order, irrespective of whether a subsequent claim for additional compensation or time extensions relating to the Change in the Work is described as a change in the requirements of the Contract Documents, a delay, a disruption of the Work, an acceleration of the Work, an impact on the efficiency of performance of the Work, an equitable adjustment, or other claim and irrespective of whether the impact of the Change in the Work is considered singly or in conjunction with the impact of other Changes in the Work.

7.6 CONSTRUCTION CHANGE DIRECTIVES

A. Contractor will promptly comply with all Construction Change Directives.

B. Pending final resolution of any adjustment in the Contract Sum or Contract Time relating to a Construction Change Directive, the amounts proposed by Owner in the Construction Change Directive may be included in Contractor's payment requests once the work relating thereto is completed.

C. If after the work described in the Construction Change Directive is completed, Owner, Architect, and Contractor reach agreement on adjustments in the Contract Sum, Contract Time, or both, such agreement will be reflected in an appropriate Change Order.

D. If the parties do not reach agreement regarding an adjustment to the Contract Sum, Contract Time, or both relating to the Construction Change Directive within thirty (30) days of the completion of the work described therein, then Contractor may submit its claim for an adjustment pursuant to Section 13 within thirty (30) days of the completion of such work. Contractor agrees that if it fails to submit its claim for resolution pursuant to Section 13 within thirty (30) days of completion of the work described in the Construction Change Directive, then it will not be entitled to an adjustment in Contract Sum or Contract Time resulting from such work except as set forth in the Construction Change Directive and waives any claim therefor.

7.7 FIELD CHANGES

Architect and Contractor will sign a Field Change order listing the Change In The Work and the Contract Sum including markups before Contractor proceeds with the Field Change.

7.8 WAIVER OF CLAIMS

Except as set forth in Section 7, Contractor will not be entitled to any adjustment in the Contract Sum or the Contract Time or for any damages of any kind whatsoever resulting from an instruction from Owner or Architect, any event or circumstance, or any act or omission of Owner or Architect and Contractor expressly waives any and all claims therefor.

SECTION 8 - TIME

8.1 TIME IS OF THE ESSENCE

All time limits stated in the Contract Documents are of the essence. By executing the Agreement, Contractor confirms that the Contract Time is a reasonable period for performing the Work. Contractor will proceed expeditiously with adequate resources and will achieve Substantial Completion within the Contract Time.

8.2 COMMENCEMENT OF THE WORK

Contractor will not commence work on the Project site until the date set forth in the Written Notice to proceed. However, Contractor may enter into subcontracts and secure material for the Project after receipt of the Agreement with Owner's authorized signature. Owner will issue the Written Notice to proceed within forty-five (45) days after Owner receives acceptable bonds and evidence of insurance pursuant to Section 11 unless Owner earlier terminates the Agreement pursuant to Section 14.

8.3 DELAY IN COMPLETION OF THE WORK

A. For each day after the expiration of the Contract Time that Contractor has not achieved Substantial Completion, Contractor will pay Owner the amount set forth in the Supplementary Conditions as liquidated damages for Owner's loss of use of the Project

and the added administrative expense to Owner to administer the Project during the period of delay. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay. Owner may deduct any liquidated damages or reimbursable expenses from any money due or to become due to Contractor. If the amount of liquidated damages and reimbursable expenses exceeds any amounts due to Contractor, Contractor will pay the difference to Owner within ten (10) days after receipt of a written request from Owner for payment.

B. At the time Architect certifies that Contractor has achieved Substantial Completion, Architect will identify the remaining items to be completed for final completion of the Work and will establish with Contractor a reasonable time for completion of those items. Architect will set forth the items to be completed and the time established for their completion in a Certificate of Substantial Completion. For each day that Contractor exceeds the time allowed for completion of the items set forth in the Certificate of Substantial Completion, Contractor will pay to Owner as liquidated damages for additional administrative expenses the amount set forth in the Supplementary Conditions. In addition, Contractor will reimburse Owner for any additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses incurred by Owner as a result of the delay in completing such items.

SECTION 9 - PAYMENTS AND COMPLETION

9.1 SCHEDULE OF VALUES

Contractor will submit to Architect a schedule of values which allocates the Contract Sum to various portions of the Work. The schedule of values will be supported by such data to substantiate its accuracy as required by Architect. This schedule, when accepted by Owner and Architect, will be used as a basis for reviewing Contractor's payment requests.

9.2 PAYMENT REQUESTS

A. Not more than once a month, Contractor will submit a payment request to Architect for Work completed, materials stored on the site, and for materials stored offsite as of the date of the payment request. The amount of the payment request will be based upon the schedule of values and will be equal to the value of the Work completed:
   1. Less retention;
   2. Less all prior amounts paid by Owner to Contractor as part of the Contract Sum; and
   3. Less allowable offsets.

   The payment request may include Changes in the Work that have been performed by Contractor and authorized by Owner and/or Architect pursuant to Section 7. If a payment request includes materials stored offsite, Contractor will include with the payment request a list of the materials, the location where they are stored and the written request of Contractor and its performance bond surety that payment be made for such materials.

B. Contractor warrants and guarantees that upon the receipt of payment for materials and equipment, whether incorporated in the Project or not, title to such materials and equipment will pass to Owner free and clear of all liens, claims, security interests, or encumbrances. Notwithstanding this payment and passage of title, Contractor will remain responsible for all such materials and equipment until actual delivery to the project site, incorporation into the Work, and final acceptance by Owner. Contractor further warrants that no material or equipment covered by a payment request is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or any other person or entity.

9.3 PAYMENT REQUEST CERTIFICATION

A. Architect will, within seven (7) days after receipt of Contractor's payment request, forward to Owner the payment request certified for such amount as Architect determines is properly due. If Architect certifies less than the full amount of the payment request, Architect will notify Contractor and Owner of Architect's reasons for withholding certification of the full amount requested.

B. The certification of the payment request will constitute a representation by Architect to Owner based upon Architect's observations at the site and the data comprising the payment request, that the Work has progressed to the point indicated and that, to the best of Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to minor deviations from the Contract Documents correctable prior to completion, and to specific qualifications expressed by Architect. However, the certification of the payment request will not constitute a representation that Architect has:
   1. Conducted exhaustive or continuous on-site inspections to check the quantity or quality of the Work;
   2. Reviewed construction means, methods, techniques, sequences, or procedures;
   3. Reviewed copies of requisitions received from Subcontractors or other data requested by Owner to substantiate Contractor's right to payment; or
   4. Made examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.

C. In taking action on Contractor’s payment request, Owner will be entitled to rely on the accuracy and completeness of the information furnished by Contractor.

9.4 DECISIONS TO WITHHOLD CERTIFICATION AND PAYMENT

A. Architect may withhold certification of a payment request in whole or in part to the extent reasonably necessary to protect Owner if, in the opinion of Architect, the representations to Owner required by Section 9.3, Paragraph B cannot be accurately made. If

Architect is unable to certify payment in the amount of the payment request, Architect will notify Contractor and Owner as provided in Section 9.3, Paragraph A. If Contractor and Architect cannot agree on a revised amount, Architect will promptly certify a payment request for the amount for which Architect is able to make such representations to Owner. Architect may also decide not to certify payment or, because of subsequently discovered evidence or subsequent observations, may nullify the whole or a part of a payment request previously certified, to such extent as may be necessary in Architect's opinion to protect Owner from loss because of:

1. Defective work not remedied;
2. Third-party claims filed or reasonable evidence indicating probable filing of such claims;
3. Failure of Contractor to make payments properly to Subcontractors for labor, materials, equipment, construction or services;
4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
5. Damage to Owner or another contractor for which Contractor is responsible;
6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance will not be adequate to cover the cost of completing the Work and damages for the anticipated delay; or
7. Contractor's persistent failure to carry out the Work in accordance with the Contract Documents.

B. Owner reserves the right to withhold payments to Contractor, subsequent to Architect's certification of any payment request, in order to protect Owner from loss due to any condition described in Section 9.4, Paragraph A, Subparagraphs 1 through 7. Upon satisfactory resolution of any such conditions, payments so withheld will be made.

9.5 PROGRESS PAYMENTS

A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after Owner receives the certified payment request from Architect.

B. Owner will make payments to Contractor by either placing the payments in the mail addressed to Contractor or by electronic transfer at Owner’s discretion.

C. Upon receipt of any payment from Owner, Contractor will pay to each Subcontractor the amount paid to Contractor on account of such Subcontractor's portion of the Work.

D. Contractor will maintain a copy of each payment request at the Project site for review by the Subcontractors.

E. No payment made under the Contract Documents, either in whole or in part, will be construed to be an acceptance of defective or improper materials or workmanship.

F. In addition and notwithstanding the foregoing, Owner will also withhold and retain 10% of payments made to Contractor.

G. Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days after Contractor achieves Substantial Completion, submits its payment request for retained funds, delivers to the Architect Owner’s form entitled “Contractor’s Substantial Completion Affidavit and Consent of Surety” fully executed by Contractor and its surety, obtains Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, and Owner receives a certificate of occupancy.

9.6 FINAL PAYMENT

A. Owner will make full and final payment of the Contract Sum within thirty (30) days of the completion of all of the following requirements:

1. Contractor has submitted its final payment request;
2. Architect has declared to Owner in writing that the Work is complete;
3. Contractor has obtained waiver and release upon final payment documents executed by all of the subcontractors performing work and/or providing materials covered by the Contractor’s final payment request; and
4. Contractor has collected and provided to Owner all manufacturers’ and other guaranties and warranties, properly signed and endorsed to Owner, that are required by the Contract Documents that extend for a period beyond one year after substantial completion. (Delivery of such guaranties and warranties will not relieve Contractor for any obligation assumed under any other provision of the Contract Documents.).

B. Acceptance of final payment by Contractor or any Subcontractor will constitute a waiver of claims by the payee except for those claims previously made in writing pursuant to Section 7 and identified by Contractor in its affidavit as still pending.

C. If the aggregate of previous payments made by Owner exceeds the amount due Contractor, Contractor will reimburse the difference to Owner.

SECTION 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

Contractor will be responsible to Owner for initiating and supervising all safety programs in connection with the performance of the Work.

10.2 SAFETY OF PERSONS AND PROPERTY

A. Contractor will take reasonable precautions to prevent damage, injury, or loss to:

1. All persons on the site;
2. The Work and materials and equipment to be incorporated into the Work; and
3. Other property at the site or adjacent to it.

B. Contractor will give notices and comply with applicable laws, ordinances, rules, regulations, and other lawful requirements of public authorities bearing on the safety or protection of persons and property. No work will be performed that may pose an undue safety hazard to Contractor, Contractor's employees, or any other person.

C. Contractor will designate a responsible member of its organization at the site whose duty will be the prevention of accidents. This person will be Contractor's onsite representative unless otherwise designated in writing by Contractor to Owner and Architect.

10.3 EMERGENCIES

In case of an emergency endangering life or threatening the safety of any person or property, Contractor may, without waiting for specific authorization from Architect or Owner, act at its own discretion to safeguard persons or property. Contractor will immediately notify Architect of such emergency action and make a full written report to Architect within five (5) days after the event.

10.4 HAZARDOUS MATERIALS

In the event the Contractor encounters on the site material reasonably believed to be hazardous materials which have not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and Architect in writing. The Work in the affected area shall be resumed in the absence of hazardous materials, or when it has been rendered harmless, by written agreement of the Owner and Contractor.

SECTION 11 - INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

A. Contractor will obtain the following insurance and provide evidence thereof as described below prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier:
   1. Workers Compensation Insurance.
   2. Employers Liability Insurance with minimum limits of the greater of $500,000 E.L. each accident, $500,000 E. L. disease-each employee, $500,000 E.L. disease-policy limit or as required by the law of the state in which the Project is located.

   3. Commercial General Liability Insurance – ISO Form CG 00 01 (12/07) or equivalent Occurrence policy which will provide primary coverage to the additional insureds (the Owner and the Architect) in the event of any Occurrence, Claim, or Suit with:
      a. Limits of the greater of Contractor's actual coverage amounts or the following:
         1) $2,000,000 General Aggregate;
         2) $2,000,000 Products - Comp/Ops Aggregate:
         3) $1,000,000 Personal and Advertising Liability:
         4) $1,000,000 Each Occurrence;
         5) $50,000 Fire Damage to Rented Premises (Each Occurrence).
      b. Endorsements attached to the General Liability policy including the following or their equivalent:
         1) ISO Form CG 25 03 (05/09), Amendment of Limits of Insurance (Designated Project or Premises), describing the Agreement and specifying limits as shown above.
         2) ISO Form CG 20 10 (07/04), Additional Insured -- Owners, Lessees, Or Contractors (Form B), naming Owner and Architect as additional insureds.
   4. Automobile Liability Insurance, with:
      a. Combined Single Limit each accident in the amount of $1,000,000 or Contractor's actual coverage, whichever is greater; and
      b. Coverage applying to "Any Auto."

B. Contractor will provide evidence of such insurance to Owner as follows:
   1. Deliver to Owner a Certificate of Liability Insurance, on ACORD 25 (2010/05) Form, or equivalent:
      a. Listing Owner and its consultants as the Certificate Holders and Additional Insured on the general liability and any excess liability policies;
      b. Attaching the ISO or equivalent endorsements set forth above to the Certificate of Liability Insurance;
      c. Identifying the Project;
      d. Listing the insurance companies providing coverage (All companies listed must be rated in A.M. Best Company Key Rating Guide-Property-Casualty and each company must have a rating of B+ Class VII or better. Companies which are not rated are not acceptable); and
      e. Bearing the name, address and telephone number of the producer and signed by an authorized representative of the producer. The signature may be original, stamped, or electronic.

C. Contractor will maintain, from commencement of the Work, Insurance coverage required herein as follows:
   1. Commercial General Liability Insurance through expiration of warranty period specified in Section 12.2, Paragraph B. including completion of any warranty repairs; and
   2. All other insurance through Final Payment.

D. Owner reserves the right to reject any insurance company, policy, endorsement, or certificate of insurance with or without cause.

E. Owner may, in writing and at its sole discretion, modify the insurance requirements.

F. The cost of insurance as required above will be the obligation of Contractor. Contractor will be responsible for payment of all deductible amounts under all insurance.

G. Owner will provide builders risk insurance for the cost of the Project. The policy will be written on an all risk basis with coverage for perils of wind, flood, earthquake, and terrorism, with exclusions standard for the insurance industry. The policy will be subject to a $5,000 deductible per occurrence which will be the responsibility of Contractor and will not be a reimbursable expense. Owner will provide a copy of the terms and conditions of the builders risk policy to Contractor upon Contractor's request. Contractor will comply with terms, conditions, and deadlines of the builders risk policy. The terms, conditions, and deadlines of the builders risk policy shall govern coverage. In addition, when there is a loss which may be covered by the builders risk insurance policy, Contractor will comply with the following:
   1. Contractor will report the loss immediately to builders risk commercial insurer by calling 1-866-537-7475 and shall make such further written submissions as required and otherwise comply with all requirements of the builders risk policy.
   2. Contractor will report the loss immediately to the Owner.
   3. Contractor will immediately notify its general liability insurance carrier of the loss.
   4. Contractor will take all necessary and appropriate actions to protect the property and individuals from further loss, harm, and injury. In the event there are damages resulting from fire or water, restoration shall be performed only by a certified restoration contractor.
   5. To the extent possible, Contractor will preserve and not disturb the evidence of the loss until after the builders risk commercial insurer and all interested parties and their insurance carriers have had the opportunity to view and investigate the site and loss.
   6. Contractor will cooperate with Owner and the builders risk commercial insurer in the investigation, documentation, and settlement of loss claims, including without limitation promptly responding to all requests for information and documentation from the builders risk commercial insurer and/or Owner.

11.2 PERFORMANCE BOND AND LABOR AND MATERIAL PAYMENT BOND

A. Prior to commencement of the Work or within ten (10) days after signing the Agreement, whichever is earlier, Contractor will furnish to Owner a performance bond and a labor and material payment bond each in an amount equal to one hundred percent (100%) of the Contract Sum as security for all obligations arising under the Contract Documents. Such bonds will:
   1. Be written on Form AIA Document A312 (1984).
   2. Be issued by a surety company or companies licensed in the state in which the Project is located and holding valid certificates of authority under Sections 9304 to 9308, Title 31, of the United States Code as acceptable sureties or reinsurance companies on federal bonds.
   3. Have a penal sum obligation not exceeding the authorization shown in the current revision of Circular #570 as issued by the United States Treasury Department, i.e. "Treasury List".
   4. Be accompanied by a certified copy of the power of attorney stating the authority of the attorney-in-fact executing the bonds on behalf of the surety.

B. Owner reserves the right to reject any surety company, performance bond, or labor and material payment bond with or without cause.

C. The cost of the bonds as required above will be the obligation of Contractor.

SECTION 12 - UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

Contractor will notify Architect at least twenty-four (24) hours in advance of performing work that would cover up work or otherwise make it difficult to perform inspections required by the Specifications or by applicable governing authorities. Should any such work be covered without proper notification having been given to Architect, Contractor will uncover that work for inspection at its own expense.

12.2 CORRECTION OF WORK

A. Contractor will promptly correct any portion of the Work that is rejected by Architect or which fails to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed, or completed. Contractor will bear the cost of correcting such rejected Work, including additional testing and inspection costs, compensation for Architect's services, and any other expenses made necessary thereby.

B. Contractor will remedy any defects due to faulty materials, equipment, or workmanship which appear within a period of one (1) year from the date of Substantial Completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the Contract Documents. Contractor will pay all costs of correcting faulty work, including without limitation additional Architect's fees, attorney fees, expert fees, consultant fees, copy costs, and other expenses when incurred.

C. Nothing in the Contract Documents will be construed to establish a period of limitation within which Owner may enforce the obligation of Contractor to comply with the Contract Documents. The one-year period specified above has no relationship to the time within which compliance with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations.

12.3 ACCEPTANCE OF NONCONFORMING WORK

A. If Owner prefers to accept any portion of the Work not in conformance with the Contract Documents, Owner may do so instead of requiring removal and correction of the nonconforming Work. In that event, the Contract Sum will be reduced by an amount agreed upon by the parties that reflects the difference in value to Owner between the Work as specified and the nonconforming Work. Such adjustment may consider increased maintenance costs, early replacement costs, increased inefficiency of use, and the like and will be effective whether or not final payment has been made. Such adjustment will be reflected in a Change Order pursuant to Section 7.5.

B. Temporary or trial usage by Owner or Architect of mechanical devices, machinery, apparatus, equipment, or other work or materials supplied under the Contract Documents prior to written acceptance by Architect, will not constitute Owner's acceptance.

SECTION 13 - RESOLUTION OF DISPUTES

13.1 SUBMITTAL OF DISPUTE

In the event there is any dispute arising under this Agreement which cannot be resolved by agreement between the parties, either party may submit the dispute with all documentation upon which it relies to the Director of Architecture, Engineering, and Construction, Meetinghouse Facilities Department, 50 East North Temple, Salt Lake City, Utah 84150, who will convene a dispute resolution conference within thirty (30) days. The dispute resolution conference will constitute settlement negotiations and any settlement proposal made pursuant to the conference will not be admissible as evidence of liability. In the event that the parties do not resolve their dispute pursuant to the dispute resolution conference, either party may commence legal action to resolve the dispute. Any such action must be commenced within six (6) months from the first day of the dispute resolution conference or be time barred. Submission of the dispute to the Director as outlined above is a condition precedent to the right to commence legal action to resolve any dispute. In the event that either party commences legal action to adjudicate any dispute without first submitting the dispute to the Director, the other party will be entitled to obtain an order dismissing the litigation without prejudice and awarding such other party any costs and attorney fees incurred by that party in obtaining the dismissal, including without limitation copy costs, and expert and consultant fees and expenses.

13.2 CONTRACTOR TO PROCEED WITH DILIGENCE

Pending final resolution of a dispute hereunder, Contractor will proceed diligently with the performance of its obligations under this Agreement.

SECTION 14 - TERMINATION

14.1 TERMINATION BY CONTRACTOR

In the event Owner materially breaches any term of the Contract Documents, Contractor will promptly give Written Notice of the breach to Owner. If Owner fails to cure the breach within ten (10) days of the Written Notice, Contractor may terminate the Agreement by giving Written Notice to Owner and recover from Owner the percentage of the Contract Sum represented by the Work completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation or damages as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor’s indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

14.2 TERMINATION BY OWNER FOR CAUSE

Should Contractor fail to provide Owner with the bonds and certificates of insurance required by Section 11 within the time specified therein, make a general assignment for the benefit of its creditors, fail to apply enough properly skilled workmen or specified materials to properly prosecute the Work in accordance with Contractor’s schedule, or otherwise materially breach any provision of the Contract Documents, then Owner may, without any prejudice to any other right or remedy, give Contractor Written Notice thereof. If Contractor fails to cure its default within ten (10) days, Owner may terminate the Agreement by giving Written Notice to Contractor. In such case, Owner may, in Owner’s sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor and/or take possession of the premises and all materials, tools, equipment, and appliances thereon, and finish the Work by whatever method Owner deems expedient. Contractor will not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds the expense of finishing the Work, including compensation for additional administrative, architectural, consultant, and legal services (including without limitation attorney fees, expert fees, copy costs, and other expenses), such excess will be paid to Contractor. If such expense exceeds the unpaid balance, Contractor will pay the difference to Owner. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Without limitation, Contractor’s indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

14.3 TERMINATION BY OWNER FOR CONVENIENCE

Notwithstanding any other provision contained in the Contract Documents, Owner may, without cause and in its absolute discretion, terminate the Agreement at any time. In the event of such termination, Contractor will be entitled to recover from Owner the

percentage of the Contract Sum equal to the percentage of the Work which Architect determines has been completed on the Project site as of the date of termination together with any out of pocket loss Contractor has sustained with respect to materials and equipment as a result of the termination prior to completion of the Work, less any offsets. Contractor will not be entitled to unearned profits or any other compensation as a result of the termination and hereby waives any claim therefor. Contractor will provide to Owner all warranty, as built, inspection, and other close out documents as well as materials that Contractor has in its possession or control at the time of termination. Owner may, in Owner's sole discretion, take legal assignment of subcontracts and other contractual rights of Contractor. Without limitation, Contractor's indemnities and obligations under section 3.14 as well as all warranties in the specifications relative to Work provided through the date of termination survive a termination hereunder.

SECTION 15 - MISCELLANEOUS PROVISIONS

15.1 GOVERNING LAW

The parties acknowledge that the Contract Documents have substantial connections to the State of Utah. The Contract Documents will be deemed to have been made, executed, and delivered in Salt Lake City, Utah. To the maximum extent permitted by law, (i) the Contract Documents and all matters related to their creation and performance will be governed by and enforced in accordance with the laws of the State of Utah, excluding conflicts of law rules; and (ii) all disputes arising from or related to the Contract Documents will be decided only in a state or federal court located in Salt Lake City, Utah and not in any other court or state. Toward that end, the parties hereby consent to the jurisdiction of the state and federal courts located in Salt Lake City, Utah and waive any other venue to which they might be entitled by virtue of domicile, habitual residence, place of business, or otherwise.

15.2 NO WAIVER

No action or failure to act by Owner, Architect, or Contractor will constitute a waiver of a right or duty afforded them under the Contract Documents, nor will such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

15.3 RULE OF CONSTRUCTION

Owner and Contractor agree that the Contract Documents will be deemed to have been drafted by both Owner and Contractor and will not be construed against either Owner or Contractor because of authorship.

15.4 ENFORCEMENT

In the event either party commences legal action to enforce or rescind any provision of the Contract Documents, the prevailing party will be entitled to recover its attorney fees and costs, including without limitation all copy costs and expert and consultant fees and expenses, incurred in that action and on all appeals, from the other party.

15.5 TESTS AND INSPECTIONS

A. Owner and Architect have the right to have tests made when they deem it necessary. Tests conducted by Owner or Architect will be paid for by Owner. Should a test reveal a failure of the Work to meet Contract Document requirements, the cost of the test as well as subsequent tests related to the failure necessary to determine compliance with the Contract Documents will be paid for by Owner, with the cost thereof deducted from the Contract Sum by Modification.

B. Tests will be made in accordance with recognized standards by a competent, independent testing laboratory. Materials found defective or not in conformity with Contract Document requirements will be promptly replaced or repaired at the expense of Contractor.

C. Owner and Architect have the right to obtain samples of materials to be used in the Work and to test samples for determining whether they meet Contract Document requirements. Samples required for testing will be furnished by Contractor and selected as directed by Architect. Samples may be required from the sample's source, point of manufacture, point of delivery, or point of installation at Architect's discretion. Samples not required as a Submittal in the Specifications will be paid for by Owner. Should tests reveal a failure of the Sample to meet the Contract Document requirements, Contractor will provide other Samples that comply with the requirements of the Contract Documents.

END OF DOCUMENT

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SUPPLEMENTARY CONDITIONS
FIXED SUM (U.S.)

ITEM 1 - GENERAL

1. Conditions of the Agreement and General Conditions apply to each Division of the Specifications.
2. Provisions contained in Division 01 apply to all Divisions of the Specifications.

ITEM 2 - LIQUIDATED DAMAGE AMOUNTS:

1. The amount of liquidated damages to the benefit of the Contractor for delays under General Conditions Section 7.3, Paragraph B is $500.00 per day.
2. The amount of liquidated damages to be paid to the Owner for delays in Substantial Completion under General Conditions Section 8.3, Paragraph A is $500.00 per day.
3. The amount of liquidated damages to be paid to the Owner for delays in completing work itemized on the Substantial Completion Certificate under General Conditions Section 8.3, Paragraph B is $150.00 per day.

ITEM 3 - PERMITS

1. Delete Section 3.6, Paragraph B of the General Conditions and replace with the following:

   B. The Owner will pay the costs of permits, fees and improvement bonds required by local agencies necessary for the proper execution and completion of the work. Contractor shall obtain all permits and pay all fees, which will be reimbursed by the Owner without markup. These costs shall not be included in the bid amount. Contractor will conform to all ordinances and covenants governing the Project Site and/or Work.

ITEM 4 - STATE SPECIFIC SUPPLEMENTARY CONDITIONS

RETENTION APPLIED TO CONTRACTOR PAYMENTS FOR PROJECTS IN UTAH:

Replace section 9.5.F of the General Conditions with the following:

F. In addition and notwithstanding the foregoing, Owner may also withhold and retain 5% of payments made to Contractor. These retention funds will be held in an interest bearing account.

PAYMENT OF RETAINED FUNDS IN UTAH:

Replace section 9.5 G of the General Conditions with the following:

G. After Contractor achieves Substantial Completion and submits its payment request for retained funds and delivers to the Architect Owner's form entitled "Contractor's Substantial Completion Affidavit and Consent of Surety" fully executed by Contractor and its surety, if any, and provides statutory Conditional Waiver and Release documents executed by all subcontractors and suppliers having claim against the retained funds, Owner will pay any unpaid retention less any amounts withheld pursuant to Section 9.4 within forty-five (45) days from the later of (a) the date Owner received Contractor's

payment request for retained funds and fully executed Contractor's Substantial Completion Affidavit and Consent of Surety, (b) the date a certificate of occupancy is issued; (c) the date that a building inspector having authority to issue its own certificate of occupancy does not issue that certificate but permits occupancy.

UTAH STATE SALES TAX:

Add the following to the General Conditions:

1. Contractors should be exempt on purchases of material installed or converted into real property to be used by the Owner. The Contractor will furnish each vendor with a completed Exemption Certificate Form TC-721. The certificate will be prepared by the Contractor for each vendor in order to obtain the exemption.
2. The Owner's tax exempt number is 11871701-002-STC.

UTAH NOTICE OF INTENT TO OBTAIN FINAL COMPLETION:

Add the following to the General Conditions:

A. Contractor will file with the State Construction Registry, on its own behalf and/or on behalf of Owner, a notice of intent to obtain final completion at least 45 days before the day on which the Owner or Contractor files or could file a notice of completion under Utah Code Ann. Section 38-1a-506 if:

1. The completion of performance time under the original contract for construction work is greater than 120 days;
2. The total original construction contract price exceeds $500,000; and
3. The original contractor or owner has not obtained a payment bond in accordance with Utah Code Ann. Section 14-2-1.

UTAH NOTICE OF COMPLETION:

Add the following to the General Conditions:

A. Within five (5) calendar days of final completion of the Project and in compliance with Section 38-1a-507 Utah Code Annotated, Contractor will file with the State Construction Registry, and copy to Owner, a notice of completion which will include, without limitation, the following:

1. The name, address, telephone number, and email address of the person filing the notice of completion;
2. The name of the county in which the Project and/or Project site is located;
3. The date on which final completion is alleged to have occurred;
4. The method used to determine final completion; and
5. One of the following:
    a. The tax parcel identification number of each parcel included in the Project and/or Project site;

b. The entry number of a preliminary notice on the same project that includes the tax parcel identification number of each parcel included in the Project and/or Project site; or

c. The entry number of the building permit issued for the Project.

B. Notwithstanding any other provision of the Contract Documents to the contrary, Contractor and Owner agree that any breach or failure to comply with this Section by the Contractor will constitute a breach of contract and the Contractor will be liable for any direct, indirect, or consequential damages to the Owner flowing from this breach.

UTAH PROGRESS PAYMENTS AND FINAL PAYMENT:

Replace Section 9.5.A of the General Conditions with the following:

9.5 PROGRESS PAYMENTS

A. Owner will pay Contractor progress payments within the parameters of Section 9.2 within fifteen (15) days after:

1. Contractor has submitted a progress payment request;
2. Contractor has obtained Conditional Waiver and Release Upon Progress Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's progress payment request; and
3. Owner receives the certified payment request from Architect.

Replace Section 9.6.A.3 of the General Conditions with the following:

9.6 FINAL PAYMENT

3. Contractor has obtained Waiver and Release Upon Final Payment documents (in content complying with Utah Code § 38-1a-802) executed by each of the subcontractors performing work and/or providing materials covered by the Contractor's final payment request;

END OF DOCUMENT

B L A N K P A G E

SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Summary of Work.

B. Work restrictions.

C. Owner-furnished materials.

D. Management of multiple contracts.

1.02 PROJECT

A. Project Name: Taylor 1,2,3,4

B. Owner's Name: The Church of Jesus Christ of Latter-day Saints

C. Architect's Name: Bradley Gygi Architect & Associates, PLLC

D. The Project consists of the construction of reroofing with related structural repairs and upgrades, mechanical and electrical at roof penetrations.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

A. Provisions contained in Division 01 apply to Sections of Divisions 02 through 49 of Specifications. Instructions contained in Specifications are directed to Contractor. Unless specifically provided otherwise, obligations set forth in Contract Documents are obligations of Contractor

B. Contractor shall furnish total labor, materials, equipment, and services necessary to perform The Work in accordance with Contract Documents.

1.04 CONTRACT DESCRIPTION

A. Contract Type: A single prime contract based on a Stipulated Price unless directed differently by owners representative.

1.05 OWNER OCCUPANCY

A. Owner intends to occupy the Project during the construction work.

B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

C. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations:
   1. Locate and conduct construction activities in ways that will limit disturbance to site.

B. Contractor will ensure that Contractor, its employees, subcontractors, and their employees comply with following requirements:
   1. Do not use or consume alcohol or cannabis, or illegal use drugs, on the Project Site or enter on or perform any Work on the Project Site while under their influence.
   2. Do not smoke or vape anything on the Project Site. Do not use tobacco in any form on the Project Site.
   3. Do not perform Work on the Project Site on Sundays except for emergency work.
   4. Refrain from using profanity or being discourteous or uncivil to others on the Project Site or while performing Work under this Agreement.
   5. Do not view or allow pornographic or other indecent materials on the Project Site.
   6. Do not play obnoxious and/or loud music on the Project Site. Do not play any music within existing facilities.
   7. Refrain from wearing immodest, offensive, or obnoxious clothing, while on the Project Site.
   8. Do not bring weapons on the Project Site.

C. Existing building spaces may not be used for storage.

D. Do not load or permit any part of the structure to be loaded with a weight that will endanger its safety. Questions of structural loading as part of construction means and methods shall be addressed by a licensed structural engineer engaged by Contractor, subject to the review by Architect.

1.07 MULTIPLE CONTRACT SUMMARY

A. Owner may issue separate contracts for operations scheduled to precede and be substantially completed before beginning of The Work under this Contract.
   1. Contractor will be given written notice from such contractors of any revisions to scheduled completion of their work at least 30 days in advance. Owner will reimburse Contractor for expenses incurred by Contractor by failure to be properly notified.

B. Owner has issued or will issue separate contracts for operations scheduled to be completed between Notice to Proceed and Substantial Completion.
   1. General:
      a. Schedule performance of work covered by such separate contracts in Contractor's Construction Schedule so as to avoid delays in Substantial Completion. Give written notice to such contractors and to Owner of any revisions to scheduled delivery and work dates at least 90 days in advance.
      b. Complete work necessary to accommodate items provided under such separate contracts before scheduled date for performance of such work. Contractor will be back charged for actual expenses incurred by Owner for failure to timely complete such work including, but not limited to, cost of crews during downtime or for call backs and costs to correct substrate deficiencies.
      c. Store and protect completed work provided under separate contracts until date of Substantial Completion.
   2. Separate contracts issued by Owner
      a. Testing and Inspection. See Section 01 4000 “Quality Requirements” for testing and inspection, and testing laboratory services for materials, products, and construction methods:

1.08 MULTIPLE CONTRACT COORDINATION

A. Contractor shall be responsible for accurately maintaining and reporting schedule of The Work from Notice to Proceed to date of Substantial Completion.

B. Contractor shall be responsible for providing Temporary Facilities And Controls for those who perform work on Project from Notice to Proceed to date of Substantial Completion.

C. Contractor shall be responsible for providing Construction Waste Management And Disposal services for those who perform work on Project from Notice to Proceed to date of Substantial Completion.

D. Contractor shall be responsible for Final Cleaning for entire Project.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 01 1000

SECTION 01 2000
PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedures for preparation and submittal of applications for progress payments.

B. Procedures for preparation and submittal of application for final payment.

1.02 SCHEDULE OF VALUES

A. Submit schedule of values as directed by Owner's representative within 24 hours of project bid. Coordinate preparation of schedule of values with preparation of Contractor's Construction Schedule. Correlate line items in Schedule of Values with other required administrative schedules and forms, including:
   1. Contractor's Construction Schedule.
   2. Payment Request form.
   3. Schedule of Allowances.
   4. Schedule of Alternates.

B. Electronic media printout including equivalent information may be considered in lieu of standard form specified; submit draft to Architect for approval.

C. Forms filled out by hand will not be accepted.

1.03 APPLICATIONS FOR PROGRESS PAYMENTS

A. Payment Period: Submit at intervals stipulated in the Agreement.

B. Use Payment Request forms provided by Owner.

C. Provide following submittals before or with submittal of Initial Payment Request:
   1. List of Subcontractors.
   2. Initial progress report.
   3. Contractor's Construction Schedule.
   4. Submittal Schedule.

D. Each Payment Request will be consistent with previous requests and payments certified by Architect and paid for by Owner.

E. Electronic media printout including equivalent information may be considered in lieu of standard form specified; submit sample to Architect for approval.

F. Forms filled out by hand will not be accepted.

G. Execute certification by signature of authorized officer.

H. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed.

I. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.

J. Submit copy of each Application for Payment.

K. Construction progress schedule, revised and current as specified in Section 01 3216.

1.04 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Provide Affidavit of Contractor and Consent of Surety with Payment Request following Substantial Completion.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General administrative requirements.

B. Preconstruction meeting.

C. Progress meetings.

D. Pre-Installation Conferences

E. Submittals for review, information, and project closeout.

F. Submittal procedures.

1.02 GENERAL ADMINISTRATIVE REQUIREMENTS

A. Comply with requirements of Section 01 7000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.

B. Project designation for this Project is [Insert Project Designation]. This Project designation will be included on documents generated for Project by Contractor and Subcontractors, or be present on a cover letter accompanying such documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRECONSTRUCTION MEETING

A. Architect will schedule a meeting after Notice of Award.

B. Architect will record minutes and distribute copies within three working days after meeting to participants and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. Architect will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

B. Progress meetings will be open to Owner, Architect, Subcontractors, and anyone invited by Owner, Architect, and Contractor.

C. Architect will record minutes and distribute copies within three working days after meeting to participants and those affected by decisions made.

3.03 PRE-INSTALLATION CONFERENCES

A. Attend pre-installation conferences specified in Contract Documents.
   1. If possible, schedule these conferences on same day as regularly scheduled Progress Meetings. If this is not possible, coordinate scheduling with Architect.
   2. Request input from attendees in preparing agenda.

B. See individual specification sections for information to include in Pre-Installation Conferences.

C. Architect will record minutes and distribute copies within three working days after meeting to participants and those affected by decisions made.

3.04 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format, listing items specified to be furnished for review to Architect including product data, shop drawings, samples, and Informational Submittals.
   1. Submit at the same time as the preliminary schedule or 20 days after receipt of Notice to Proceed.
   2. Coordinate with Contractor's construction schedule.

3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Enclose the following information for each item:
    a. Scheduled date for first submittal.
    b. Related Section number.
    c. Submittal category.
    d. Name of Subcontractor.
    e. Description of part of the Work covered.
    f. Scheduled date for resubmittal.
    g. Scheduled date for Architect's final release or approval.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
    a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.
    b. Print and distribute copies to Architect and Owner and post copy in field office. When revisions are made, distribute to same parties and post in same location.
    c. Revise schedule monthly. Send copy of revised schedule to Owner and Architect and post copy in field office.

3.05 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
    1. Product data.
    2. Shop drawings.
    3. Samples for selection.
    4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.06 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
    1. Design data.
    2. Certificates.
    3. Test reports.
    4. Inspection reports.
    5. Manufacturer's instructions.
    6. Manufacturer's field reports.
    7. Field engineering daily reports.
    8. Special Procedure Submittals: Describe submittals intended to document special procedures. An example would be construction staging or phasing for remodeling an existing facility while keeping it in operation. While the Contractor would normally be responsible for managing this, submittal of his plan as documentation could be specified.
    9. Qualification Statements: Describe submittals intended to document qualification of entities employed by Contractor.
    10. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.07 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Project Manual: Complete Project Manual including Addenda and Modifications as defined in General Conditions.
   6. Record Documentation: Describe submittal of record documentation specific to the Section.
   7. Software: Describe submittal system software and programming software specific to the Section.
   8. Copies of permits, AHJ approvals, and inspections, including final inspection and/or certificate of occupancy.
   9. Copies of reports from testing agency.

D. Submit for Owner's benefit during and after project completion.

3.08 MAINTENANCE MATERIAL SUBMITTALS

A. This title groups maintenance material required submittals specific to the Section. Items may be provided at completion of Work or submitted with section 01 7800 - Closeout Submittals:
   1. Spare Parts: Describe spare parts necessary for Owner’s use in facility operation and maintenance. ‘Parts’ are generally understood to be items such as filters, motor drive belts, lamps, and other similar manufactured items that require only simple replacement.
   2. Extra Stock Materials: Describe extra stock materials to be provided for Owner’s use in facility operation and maintenance. Extra stock materials are generally understood to be items such as ceiling tiles, flooring, paint etc.
   3. Tools:
      a. Describe tools to be provided for Owner’s use in facility operation and maintenance. Tools are generally understood to be wrenches, gauges, circuit setters, etc, required for proper operation or maintenance of a system.

3.09 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

3.10 SUBMITTAL PROCEDURES

A. General Requirements:
   1. Identification:
      a. Place permanent label or title block on each submittal for identification. Include name of entity that prepared each submittal on label or title block.
         1) Provide space approximately 4 by 5 inches on label or beside title block on Shop Drawings to record Contractor's review and approval markings and action taken.
         2) Include following information on label for processing and recording action taken:
            (a) Project name.
            (b) Date.
            (c) Name and address of Architect.
            (d) Name and address of Contractor.
            (e) Name and address of Subcontractor.
            (f) Name and address of supplier.
            (g) Name of manufacturer.
            (h) Number and title of appropriate Specification Section.
            (i) Drawing number and detail references, as appropriate.
   2. Use a single transmittal for related items.

3. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
4. Transmit using approved form.
    a. Use Contractor's form, subject to prior approval by Architect.
5. Sequentially identify each item. For revised submittals use original number and a sequential "R" suffix.
6. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
7. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
8. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    a. Deliver submittals to Architect at business address.
    b. Send submittals in electronic format via email to Architect.
9. Schedule submittals to expedite the Project, and coordinate submission of related items.
    a. For each submittal for review, allow 21 days excluding delivery time to and from the Contractor.
    b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 10 days.
    c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
10. No extension of Contract Time will be authorized because of failure to transmit submittals to Architect in sufficient time before work is to be performed to allow processing.

B. Product Data Procedures:
1. Mark each copy of each set of submittals to show choices and options used on Project. Where printed Product Data includes information on products that are not required for Project, mark copies to indicate information relating to Project.
2. Certify that proposed product complies with requirements of Contract Documents. List any deviations from those requirements on form or separate sheet.
3. Submit only information required by individual specification sections.
4. Collect required information into a single submittal.
5. Submit concurrently with related shop drawing submittal.
6. Do not submit (Material) Safety Data Sheets for materials or products.

C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 36 by 48 inches. Highlight, encircle, or otherwise show deviations from Contract Documents. Include following information as a minimum:
    a. Dimensions.
    b. Identification of products and materials included.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
4. Review and designate (stamp) approval of shop drawings. Unless otherwise specified, submit to Architect six copies of shop drawings required by Contract Documents. Shop

drawings not required by Contract Documents, but requested by Contractor or supplied by Subcontractor, need not be submitted to Architect for review.

D. Samples Procedures:
   1. Transmit related items together as single package.
   2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
   3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.
   4. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
      a. Mount, display, or package Samples to ease review of qualities specified. Prepare Samples to match samples provided by Architect, if applicable. Include following:
         1) Generic description of Sample.
         2) Sample source.
         3) Product name or name of manufacturer.
         4) Compliance with recognized standards.
         5) Availability and delivery time.
   5. Submit Samples for review of kind, color, pattern, and texture, for 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. Where variations in color, pattern, texture or other characteristics are inherent in material or product represented, submit set of three samples minimum that show approximate limits of variations.
      b. Refer to other specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.
      c. Refer to other Sections for Samples to be returned to Contractor for incorporation into The Work. Such Samples shall be undamaged at time of use. On transmittal, indicate special requests regarding disposition of Sample submittals.
   6. Where Samples are for selection of color, pattern, texture, or similar characteristics from a range of standard choices, submit full set of choices for material or product. Preliminary submittals will be reviewed and returned with Architect's mark indicating selection and other action.
   7. Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit three sets. One will be returned marked with action taken.
   8. Samples, as accepted and returned by Architect, will be used for quality comparisons throughout course of construction.
      a. Unless noncompliance with Contract Documents is observed, submittal may serve as final submittal.
      b. Sample sets may be used to obtain final acceptance of construction associated with each set.

END OF SECTION

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SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

C. Construction progress schedule, with network analysis diagrams and reports if required by Owner.

D. Daily Construction Reports.

1.02 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule defining planned operations for the first 60 days of Work, with a general outline for remainder of Work.

B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
   1. Include written certification that major contractors have reviewed and accepted proposed schedule.

D. Within 10 days after joint review, submit complete schedule.

E. Submit updated schedule with each Application for Payment.

1.03 SCHEDULE FORMAT

A. Provide separate time bar for each construction activity listed on Owner's payment request form.

B. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

C. Sheet Size: Multiples of 8-1/2 x 11 inches.

D. Scale and Spacing: To allow for notations and revisions.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.02 CONTENT

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Provide separate time bar for each construction activity listed on Owner's payment request form.

C. Identify each item by specification section number.

D. Identify work of separate stages and other logically grouped activities.

E. Provide sub-schedules to define critical portions of the entire schedule.

F. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

G. Indicate delivery dates for owner-furnished products.

H. Coordinate content with schedule of values specified in Section 01 2000 - Price and Payment Procedures.

I. Provide legend for symbols and abbreviations used.

3.03 ACCELERATION OF WORK

A. Complete The Work in accordance with Construction Schedule. If Contractor falls behind schedule, take such actions as are necessary, at no additional expense to Owner, to bring progress of The Work back in accordance with schedule.

B. Owner may request proposal for completion of The Work at date earlier than expiration of Contract Time:
   1. Promptly provide requested proposal showing cost of such acceleration of The Work. Consult with Owner and Architect regarding possible options to decrease cost of such acceleration.
   2. If Owner determines to order acceleration of The Work, change in Contract Sum and Contract Time resulting from acceleration will be included in a Change Order.

3.04 BAR CHARTS

A. Provide separate time bar for each construction activity listed on Owner's payment request form.

B. Include a separate bar for each major portion of Work or operation.

C. Identify the first work day of each week.

D. Project Management Software Programs:
   1. Any software project management program capable of Bar Chart Scheduling for projects of equal size and complexity is approved by Contractor and approved by Owner’s Project Manager.

3.05 NETWORK ANALYSIS IF REQUIRED BY OWNER

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:
   1. Preceding and following event numbers.
   2. Activity description.
   3. Estimated duration of activity, in maximum 15 day intervals.
   4. Earliest start date.
   5. Earliest finish date.
   6. Actual start date.
   7. Actual finish date.
   8. Latest start date.
   9. Latest finish date.
   10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
   11. Monetary value of activity, keyed to Schedule of Values.
   12. Percentage of activity completed.
   13. Responsibility.

D. Analysis Program: Capable of compiling monetary value of completed and partially completed activities, accepting revised completion dates, and re-computation of all dates and float.

E. Required Reports: List activities in sorts or groups:
   1. By preceding work item or event number from lowest to highest.
   2. By amount of float, then in order of early start.
   3. By responsibility in order of earliest possible start date.
   4. In order of latest allowable start dates.
   5. In order of latest allowable finish dates.
   6. Contractor's periodic payment request sorted by Schedule of Values listings.

7. Listing of basic input data that generates the report.
8. Listing of activities on the critical path.

3.06 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 10 days.

3.07 UPDATING SCHEDULE

A. Update schedule monthly.

B. Maintain schedules to record actual start and finish dates of completed activities.

C. Indicate progress of each activity to date of revision, with projected completion date of each activity.

D. Annotate diagrams to graphically depict current status of Work.

E. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

F. Indicate changes required to maintain Date of Substantial Completion.

G. Submit reports required to support recommended changes.

H. Provide narrative report to define problem areas, anticipated delays, and impact on the schedule. Report corrective action taken or proposed and its effect.

3.08 DISTRIBUTION OF SCHEDULE

A. Distribute copies of updated schedules to Contractor's project site file, to subcontractors, suppliers, Architect, Owner, and other concerned parties.

B. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

3.09 DAILY CONSTRUCTION REPORTS

A. Prepare daily reports utilizing means and methods as defined by the Owner.

B. Prepare daily reports of operations at Project including at least the following information:
   1. Approximate count of personnel at site.
   2. High and low temperatures, general weather conditions.
   3. Materials, equipment, or Owner-furnished items arriving at or leaving site.
   4. Accidents and unusual events.
   5. Site or structure damage by water, frost, wind, or other causes.
   6. Stoppages, delays, shortages, losses.
   7. Any tests made and their result if known.
   8. Meter readings and similar recordings.
   9. Emergency procedures.
   10. Orders and requests of governing authorities.
   11. Services connected, disconnected.
   12. Equipment or system tests and start-ups.
   13. Brief summary of work accomplished that day.
   14. Signature of person preparing report.

C. Submit daily reports to Architect at least weekly unless directed to submit reports on owner provided project management software.

D. Maintain copies of daily reports at field office.

END OF SECTION

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SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.

B. Quality assurance.

C. Qualifications.

D. Testing and inspection agencies and services.

E. Contractor's construction-related professional design services.

F. Contractor's design-related professional design services.

G. Control of installation.

H. Mock-ups.

I. Tolerances.

J. Manufacturers' field services.

K. Defect Assessment.

1.02 REFERENCE STANDARDS

A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection 2021.

1.03 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
   1. Temporary sheeting, shoring, or supports.
   2. Temporary scaffolding.
   3. Temporary bracing.
   4. Temporary falsework for support of spanning or arched structures.
   5. Temporary foundation underpinning.
   6. Temporary stairs or steps required for construction access only.
   7. Temporary hoist(s) and rigging.
   8. Investigation of soil conditions and design of temporary foundations to support construction equipment.

1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.

B. Base design on performance and/or design criteria indicated in individual specification sections.
   1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.

1.05 SUBMITTALS

A. General: Additional submittal requirements are specified in Individual Sections in Division 01 through Division 50.

B. Certificates:
   1. Testing Agency will submit certified written report of each inspection, test, or similar service.

C. Tests and Evaluation Reports:

1. Testing Agency or Agencies will prepare logs, test reports, and certificates applicable to specific tests and inspections and deliver copies (or electronic record) distributed as follows:
    a. 1 copy to Owner's Representative.
    b. 1 copy to Architect.
    c. 1 copy to Consulting Engineers (Engineer of Record).
    d. 1 copy to General Contractor.
    e. 1 copy to Authorities Having Jurisdiction (if required).
2. Other tests, certificates, and similar documents will be obtained by Contractor and delivered to Owner's Representative and Architect in such time as not to delay progress of the Work or final payment therefore.
3. Submittal Format:
    a. Schedule of Tests and Inspections: Prepare in tabular form and include 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.
    b. Certified written reports of each inspection, test, or similar service will include, but not be limited:
        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) Record of temperature and weather conditions at time of sample taking and testing and inspecting.
        11) Comments or professional opinion on whether tested or inspected Work complies with Contract Document requirements.
        12) Name and signature of laboratory inspector.
        13) Recommendations on retesting and re-inspecting.

D. Source Quality Control Submittals:
1. Testing Agency will submit following prior to commencing the Work:
    a. Qualifications of Testing Agency management and personnel designated to project.
    b. Testing Agency 'Written Practice for Quality Assurance'.
    c. Qualification records for Inspector and non-destructive testing technicians designated for project.
    d. Testing Agency non-destructive testing procedures, equipment calibration records, and personnel training records.
    e. Testing Agency Quality Control Plan for monitoring and control of testing operations.
    f. Welding Inspection Procedures (Structural Steel testing).
    g. Bolting Inspection Procedures (Structural Steel testing).
    h. Shear Connector Stud Inspection Procedures (Structural Steel testing).
    i. Seismic Connections Inspection Procedures (Structural Steel testing).

E. Testing and Inspection Reports:

1. Conduct and interpret tests and inspections and state in each report whether tested and inspected the Work complies with or deviates from requirements.
2. Laboratory Reports: Testing Agency will furnish reports of materials and construction as required, including:
    a. Description of method of test.
    b. Identification of sample and portion of the Work tested.
        1) Description of location in the Work of sample.
        2) Time and date when sample was obtained.
        3) Weather and climatic conditions at time when sample was obtained.
    c. Evaluation of results of tests including recommendations for action.
3. Inspection Reports:
    a. Testing Agency will furnish ‘Inspection at Site’ reports for each site visit documenting activities, observations, and inspections.
    b. Include notation of weather and climatic conditions, time and date conditions and status of the Work, actions taken, and recommendations or evaluation of the Work.
4. Reporting Testing and Inspection (Conforming Work):
    a. Submit testing and inspection reports as required within twenty four (24) hours of test or inspection having been performed.
5. Reporting Testing and Inspection Defective Work (Non-Conforming Work):
    a. Testing Agency, upon determination of irregularities, deficiencies observed or test failure(s) observed in the Work during performance of its services of test or inspection having been performed, will:
        1) Verbally notify results to Architect, Contractor, and Owner’s Representative within one hour of test or inspection having been performed (if Defective Work (Non-Conforming Work) is incorporated into project).
        2) Submit written inspection report and test results as required within twenty four (24) hours of test or inspection having been performed.
    b. Prepare non-compliance log to track non-compliant testing or inspections.
6. Final Report:
    a. Submit final report of tests and inspections at Substantial Completion, which identify unresolved deficiencies.

1.06 QUALIFICATIONS

A. Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements:
    1. Fabricator / Supplier / Installer Qualifications: Firm experienced in producing products similar to those indicated for this Project and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
        a. Approved:
            1) Where heading ‘Approved Suppliers / Distributors / Installers / Applicators / Fabricators' is used to identify list of specified suppliers / distributors / installers / applicators / fabricators, use only listed suppliers / installers / fabricators.
            2) No substitutions will be allowed.
        b. Acceptable Suppliers / Installers:
            1) Where heading ‘Acceptable Suppliers / Installers / Fabricators' is used, qualifications as specified in Quality Assurance in Part 1 of individual sections will be used to determine requirements of those that will be acceptable to be used on Project. Lists for acceptable installers can include additional installers that may be approved before bidding or by addendum.
    2. Factory-Authorized Service Representative Qualifications:
        a. 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.
    3. 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.

4. 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, as well as sufficient production capacity to produce required units.
5. Manufacturer's Field Services Qualifications:
   a. Experienced authorized representative of manufacturer to inspect field-assembled components and equipment installation, including service connections.
6. 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 kind indicated. Engineering services are defined as those performed for installations of system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
7. Specialists:
   a. Certain sections of Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations.
   b. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.
   c. Requirement for specialists shall not supersede building codes and regulations governing the Work.
8. Testing Agency Qualifications:
   a. Independent Testing Agency with experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
      1) Testing Laboratory:
         (a) AASHTO Materials Reference Laboratory (AMRL) Accreditation Program.
         (b) Cement and Concrete Reference Laboratory (CCRL).
         (c) Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7.
         (d) National Voluntary Laboratory (NVLAP): Testing Agency accredited according to National Institute of Standards and Technology (NIST) Technology Administration, U. S. Department of Commerce Accreditation Program.

1.07 TESTING AND INSPECTION AGENCIES AND SERVICES

A. Testing and inspecting services are used to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements.
   1. Specific quality assurance and quality control requirements for individual construction activities are specified in 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 other quality control procedures that facilitate compliance with Contract Document requirements.
   3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

B. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform specified testing and inspection.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 QUALITY ASSURANCE

A. Activities, actions, and procedures performed before and during execution of the Work to verify compliance and guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Owner or Owner's designated representative(s) will perform quality assurance to verify compliance with Contract Documents.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.

B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.

C. Demonstrate proposed range of aesthetic effects and workmanship.

D. Notify Architect seven (7) working days in advance of dates and times when mock-ups will be constructed.

E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.

F. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

G. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Architect will issue written comments within seven (7) working days of initial review and each subsequent follow up review of each mock-up.
   2. Make corrections as necessary until Architect's approval is issued.

H. Architect will use accepted mock-ups as a comparison standard for the remaining Work.

I. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 QUALITY CONTROL

A. Quality Control Services:
   1. Quality Control will be sole responsibility of Contractor.
      a. Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements performed by Contractor:
         1) They do not include inspections, tests or related actions performed by Architect, Owner, governing authorities or independent agencies hired by Owner or Architect.
         2) Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
      b. Where services are indicated as Contractor's responsibility, engage a qualified Testing Agency to perform these quality control services.
         1) Contractor shall not employ same testing entity engaged by Owner, without Owner’s written approval.

3.04 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.05 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.

B. Activities performed by Owner’s Quality Assurance Testing Agency include, but are not limited to following:
   1. Individual Sections in Division 01 through Division 49:
      a. Pre-Installation Conference agenda review items for:
         1) Schedule requirements.
         2) Testing and inspection requirements:
         3) Requirements and frequency of testing and inspections.
         4) Mock-up or sample requirements.
         5) Submittals requirements.
      b. Quality Assurance personal qualifications.
         1) Qualification documentation including certificates if required.
      c. Non-Conforming Work:
         1) Prepare non-compliance log to track non-compliant testing or inspections.
   2. Weekly Activities:
      a. Summarize and track any non-compliance issues.
      b. Provide summary report of previous week’s performed Work.
      c. Visit contractors periodically to find out if they have any concerns with Quality Assurance inspectors and check on any schedule changes.
      d. Visit Owner’s Representatives periodically to find out if they have any concerns with how project is progressing.

C. Testing Agency Duties:
   1. Test samples of mixes submitted by Contractor.
   2. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   3. Perform specified sampling and testing of products in accordance with specified standards.
   4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   5. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   6. Perform additional tests and inspections required by Architect.
   7. Attend preconstruction meetings and progress meetings.
   8. Submit reports of all tests/inspections specified.

D. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

E. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.

b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
c. To facilitate tests/inspections.
d. To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

F. Architect Duties:
1. Notify Owner's Representative before each test and/or inspection.

G. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.

H. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.06 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.

B. Submit qualifications of observer to Architect 30 days in advance of required observations.
1. Observer subject to approval of Architect.
2. Observer subject to approval of Owner.

C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.07 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. 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 Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with Contract Document requirements for Section 01 7000 - Execution and Closeout Requirements for cutting and patching.

C. Protect construction exposed by or for Quality Assurance and Quality Control activities.

D. Repair and protection are Contractor's responsibility, regardless of assignment of responsibility for Quality Assurance and Quality Control Services.

END OF SECTION

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SECTION 01 4219
REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements relating to referenced standards.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with the reference standard of date of issue specified in this section, except where a specific date is established by applicable code.

C. Obtain copies of standards when required by Contract Documents.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Date of Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by Contract Documents by mention or inference otherwise in any reference document.

G. Minimum Quantity or Quality Levels:
   1. Quantity or quality level shown or specified shall be minimum provided or performed.
   2. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits.
   3. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for context of requirements.

H. Coordination:
   1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

I. Scheduling:
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.03 INDUSTRY STANDARDS

A. Except where Contract Documents specify otherwise, construction industry standards will apply and are made a part of Contract Documents by reference.

B. Where compliance with two or more standards is specified and standards apparently establish different or conflicting requirements for minimum quantities or quality levels, refer to Architect for decision before proceeding. Quantity or quality level shown or specified will be minimum provided or performed. Actual installation may comply exactly with minimum quantity or quality specified, or it may exceed minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for context of requirements. Refer uncertainties to Architect for decision before proceeding.

C. Each entity engaged in construction on Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with Contract Documents. Where copies of standards are needed for performance of a required construction activity, Contractor will obtain copies directly from publication source.

D. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in

Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

1.04 GOVERNING REGULATIONS

A. Governing Regulations / Authorities:
   1. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.
   2. Obtain copies of regulations required to be retained at Project Site, available for reference by parties who have a reasonable need for such reference.

1.05 ABMA -- AMERICAN BEARING MANUFACTURERS ASSOCIATION, INC.

A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).

1.06 AHRI -- AIR-CONDITIONING, HEATING, AND REFRIGERATION INSTITUTE

A. AHRI 410 - Forced-Circulation Air-Cooling and Air-Heating Coils 2001, with Addenda (2011).

B. AHRI 430 (I-P) - Performance Rating of Central Station Air-handling Unit Supply Fans 2020.

C. AHRI 610 (I-P) - Standard for Performance Rating of Central System Humidifiers for Residential Applications 2014.

D. AHRI 851 (SI) - Performance Rating of Commercial and Industrial Air Filter Equipment 2013.

1.07 AISC -- AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.

1.08 AITC -- AMERICAN INSTITUTE OF TIMBER CONSTRUCTION

1.09 ALI -- AMERICAN LADDER INSTITUTE

A. ALI A14.3 - Ladders - Fixed - Safety Requirements 2008.

1.10 AMCA -- AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL, INC.

A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.

B. AMCA 99 - Standards Handbook 2016.

C. AMCA 204 - Balance Quality and Vibration Levels for Fans 2020.

D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.

E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.

F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2014.

G. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating 2018.

H. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2012 (Reapproved 2015).

1.11 ASHRAE -- AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

A. ASHRAE Std 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size 2017, with Addendum (2022).

B. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. ASHRAE Std 103 - Method of Testing for Annual Fuel Utilization Efficiency of Residential Central Furnaces and Boilers 2022.

1.12 ASSE -- AMERICAN SOCIETY OF SANITARY ENGINEERING

1.13 ASTM A SERIES -- ASTM INTERNATIONAL

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

1.14 ASTM B SERIES -- ASTM INTERNATIONAL

A. ASTM B177/B177M - Standard Guide for Engineering Chromium Electroplating 2011 (Reapproved 2021).

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

1.15 ASTM C SERIES -- ASTM INTERNATIONAL

A. ASTM C1184 - Standard Specification for Structural Silicone Sealants 2018, with Editorial Revision.

1.16 ASTM D SERIES -- ASTM INTERNATIONAL

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.

B. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.

C. ASTM D882 - Standard Test Method for Tensile Properties of Thin Plastic Sheeting 2018.

D. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.

1.17 ASTM E SERIES -- ASTM INTERNATIONAL

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

B. ASTM E2273 - Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies 2018.

C. ASTM E2486/E2486M - Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS) 2022.

1.18 ASTM G SERIES -- ASTM INTERNATIONAL

A. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).

1.19 AWI/AWMAC/WI -- JOINT PUBLICATION OF ARCHITECTURAL WOODWORK INSTITUTE/ARCHITECTURAL WOODWORK MANUFACTURERS ASSOCIATION OF CANADA/WOODWORK INSTITUTE

1.20 BIA -- BRICK INDUSTRY ASSOCIATION

1.21 HPVA -- HARDWOOD PLYWOOD VENEER ASSOCIATION

1.22 ICC-ES -- ICC EVALUATION SERVICE, INC.

A. ICC-ES AC235 - Acceptance Criteria for EIFS Clad Drainage Wall Assemblies 2009, with Editorial Revision (2012).

1.23 ISO -- INTERNATIONAL STANDARDS ORGANIZATION

1.24 MFMA -- MAPLE FLOORING MANUFACTURERS ASSOCIATION

1.25 MFMA -- METAL FRAMING MANUFACTURERS ASSOCIATION

A. MFMA-4 - Metal Framing Standards Publication 2004.

1.26 MPI -- MASTER PAINTERS INSTITUTE (MASTER PAINTERS AND DECORATORS ASSOCIATION)

A. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.27 MSS -- MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY, INC.

A. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

1.28 NAAMM -- THE NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS

A. NAAMM AMP 510 - Metal Stairs Manual 1992.

1.29 NEMA -- NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION

A. NEMA MG 1 - Motors and Generators 2021.

1.30 NFPA -- NATIONAL FIRE PROTECTION ASSOCIATION

A. NFPA 54 - National Fuel Gas Code 2021.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.

D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.

E. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances 2019.

F. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2019.

1.31 NSF -- NSF INTERNATIONAL (THE PUBLIC HEALTH AND SAFETY ORGANIZATION)

1.32 RCSC -- RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS

1.33 RIS -- REDWOOD INSPECTION SERVICE

1.34 SMACNA -- SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION, INC.

A. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.35 TMS -- THE MASONRY SOCIETY

1.36 TPI -- TRUSS PLATE INSTITUTE

1.37 UL -- UNDERWRITERS LABORATORIES INC.

A. UL (DIR) - Online Certifications Directory Current Edition.

B. UL 705 - Power Ventilators Current Edition, Including All Revisions.

C. UL 900 - Standard for Air Filter Units Current Edition, Including All Revisions.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Safety.

B. Temporary utilities.

C. Temporary sanitary facilities.

D. Temporary Controls: Barriers, enclosures, and fencing.

E. Temporary erosion and sediment control.

F. Temporary tree and plant protection.

G. Security requirements.

H. Waste removal facilities and services.

I. Field offices.

1.02 RELATED REQUIREMENTS

A. Section 01 5100 - Temporary Utilities.

1.03 REFERENCE STANDARDS

A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Protection of Existing Improvements: Protect streets, private roads, and sidewalks, including overhead protection where required. Repair damage to existing improvements caused by construction activities.

B. Protection of Adjacent Property: Provide necessary protection for adjacent property and lateral support thereof.

C. Proprietary Camera Services: In its absolute discretion, and with or without notice to Contractor, Owner may provide from time to time, but is not obligated to provide, one or more cameras on or about Project site and/or signage or notices of the same:

1. If provided by Owner, such camera(s) and/or signage and notices are solely for Owner's benefit and convenience and shall not be for benefit of Contractor, Subcontractor(s) or for any third person.
2. Owner shall have no liability, obligation, or responsibility to Contractor, Subcontractors, or any third person relative to such camera(s), signage, or notices, or absence of camera(s), signage, or notices, including without limitation, installation, maintenance, operation, repair, testing, functionality, capacity, recording, monitoring, posting, etc., of the same (hereafter 'Proprietary Camera Services').
3. Contractor, with Owner's prior consent (which shall not be unreasonably withheld), may relocate such camera(s), signage, or notices as necessary to not unreasonably, materially and physically interfere with work at Project Site.
4. Contractor's obligations under Contract Documents, including but not limited to, Contractor's obligation for security of Project Site, are not modified by Owner's opportunity to provide, actually providing, or not providing Proprietary Camera Services and/or signage or notices regarding the same.
5. This Specification Section does not preclude Contractor from providing its own camera(s), signage, or notices pursuant to terms and conditions of this Agreement. Neither does this Section reduce, expand or modify any other right or obligation of Owner pursuant to terms of this Agreement.

D. Prepare schedule indicating dates for implementation and termination of each temporary facility.

E. Keep temporary facilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.

F. Maintain facilities in good operating condition until removal.

G. Remove each temporary facility when need has ended, or when replaced by authorized use of permanent facility, or by Substantial Completion. Complete 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 make up temporary facilities are property of Contractor.
   2. By Substantial Completion, clean and renovate permanent facilities used during construction period.

1.05 SAFETY REQUIREMENTS

A. Meet regulations of 29 CFR 1926 OSHA, ‘Construction Industry Regulations’.

B. Owner’s Safety Requirements:
   1. Personal Protection:
      a. Contractor shall ensure:
         1) Positive means of fall protection, such as guardrails system, safety net system, personal fall arrest system, etc., is provided to employees whenever exposed to a fall 6 feet (1.80 m) or more above a lower level.
         2) Personnel working on Project shall wear hard hats and safety glasses as required by regulation and hazard.
         3) Personnel working on Project shall wear long or short sleeve shirts, long pants, and hard-toed boots or other sturdy shoes appropriate to type and phase of work being performed.
   2. Contractor Tools and Equipment:
      a. Contractor shall ensure:
         1) Tools and equipment are in good working condition, well maintained, and have necessary guards in place.
         2) Ground Fault Circuit Interrupters (GFCI) is utilized on power cords and tools.
         3) Scaffolding and man lifts are in good working condition, erected and maintained as required by governmental regulations.
         4) Ladders are in good condition, well maintained, used as specified by Manufacturer, and secured as required.
   3. Miscellaneous:
      a. Contractor shall ensure:
         1) Protection is provided on protruding rebar and other similar objects.
         2) General Contractor Superintendent has completed the OSHA 10-hour construction outreach training course or equivalent.
         3) Implementation and administration of safety program on Project.
         4) Material Safety Data Sheets (MSDS) are provided for substances or materials for which an MSDS is required by governmental regulations before bringing on site.
         5) Consistent safety training is provided to employees on Project.
         6) Implement and coordinate Lockout / Tagout procedures with Owner’s Representative as required.
      b. Report accidents involving injury to employees on Project that require off-site medical treatment to Owner’s designated representative.
   4. Hot Work Permit:
      a. Permit shall document that fire prevention and protection requirements in 29 CFR 1926.352, ‘Fire Prevention’ have been implemented prior to beginning hot work operations.

1) Required for doing hot work involving open flames or producing heat or sparks such as:
   (a) Brazing.
   (b) Cutting.
   (c) Grinding.
   (d) Soldering.
   (e) Thawing pipe.
   (f) Torch applied roofing.
   (g) Welding.

1.06 TEMPORARY UTILITIES - SEE SECTION 01 5100

1.07 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain in clean and sanitary condition.

C. At end of construction, return facilities to same or better condition as originally found.

1.08 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Provide protection for plants designated to remain. Replace damaged plants.

D. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

E. Secure building at the end of each workday.

F. Maintain exterior building security until Substantial Completion.

1.09 FENCING

A. Construction: Contractor's option.

B. Before construction begins, install a fence sufficient in height and structure to protect the site and preclude access except through lockable entrance gates. Locate where shown on Drawings. If not shown on Drawings, enclose entire site or portion sufficient to accommodate construction operations.

1.10 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.11 INTERIOR ENCLOSURES

A. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

1.12 SCAFFOLDING, PLATFORMS, STAIRS, ETC

A. Furnish and maintain equipment such as temporary stairs, ladders, ramps, platforms, scaffolds, hoists, runways, derricks, chutes, and elevators as required for proper execution of The Work.

B. Apparatus, equipment, and construction shall meet requirements of applicable laws and safety regulations.

1.13 TEMPORARY EROSION AND SEDIMENT CONTROL

A. Take precautions necessary to prevent erosion and transportation of soil downstream, to adjacent properties, and into on-site or off-site drainage systems.

B. Develop, install, and maintain an erosion control plan if required by law.

C. Repair and correct damage caused by erosion.

1.14 TEMPORARY ENVIRONMENTAL CONTROLS

A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and reduce possibility that air, waterways, and subsoil might be contaminated or polluted, or that other undesirable effects might result:
   1. Avoid use of tools and equipment that produce harmful noise.
   2. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near site.

B. Provide protection against weather (rain, winds, storms, frost, or heat) to maintain all work, materials, apparatus, and fixtures free from injury or damage.

C. Protect excavation, trenches, and building from damage from rainwater, spring water, ground water, backing up of drains or sewers, and all other water:
   1. For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with requirements of applicable local regulations. Where feasible, use permanent facilities.
   2. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds, and similar facilities. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

D. Comply with governing ordinances relating to weed control and removal.

1.15 TEMPORARY TREE AND PLANT PROTECTION

A. Protection:
   1. Before commencing site work, build and maintain protective fencing around existing trees and vegetation as shown on the drawings.
   2. Individual trees will have protective fencing built beyond drip line.
   3. Build protective fencing around groups of trees and other vegetation as indicated on Drawings.
   4. Keep areas within protective fencing undisturbed and do not use for any purpose.

B. Maintenance:
   1. Maintain existing tree, shrubs, and vegetation as indicated in Contract Documents:
      a. Remove and replace vegetation that dies or is damaged beyond repair due to construction.
      b. Damage to any tree, shrub, or vegetation that has been indicated to remain and be protected, will have a cost associated with it. This includes branches, trunk and root systems:
         1) Trees: $1,000.00.
         2) Shrubs: $ 100.00.
         3) Vegetation: $ 50.00.

C. Pruning:
   1. Provide a qualified Tree Service Firm if pruning is required:
      a. Coordinate with authorities having jurisdiction.
      b. Coordinate with Owner and Architect on site before pruning is to begin.

1.16 WASTE REMOVAL

A. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

1.17 FIELD OFFICES

A. Office: Weathertight, with lighting, electrical outlets, heating, cooling and ventilating equipment, and equipped with sturdy furniture, drawing rack, drawing display table, locking door, light(s), table(s), bench(es), rack(s) for drawings, telephone, and fax machine. Provide an operable fire extinguisher in facility.

B. Provide hardhats for Owner's Representatives for site visits.

C. Provide space for Project meetings, with table and chairs to accommodate 6 persons.

D. If Owner agrees to permit removal of temporary office before Substantial Completion, Contractor may use a room as an office after temporary office is removed. Equip room as specified above and restore to "like-new" condition before Substantial Completion.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 5100
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Provision of electricity, lighting, heat, ventilation, and water.

B. Contractor may use existing utilities at the existing facility to the extent they are available and convenient to the work areas.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Where necessary, engage appropriate local utility companies to install temporary service or connect to existing service. Where utility company provides only part of service, provide remainder with matching, compatible materials and equipment. Comply with utility company's recommendations.
   1. Comply with industry standards and applicable laws and regulations of authorities having jurisdiction.
   2. Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.
   3. Arrange with utility company and existing users for time when service can be interrupted, where necessary, to make connections for temporary services.
   4. Provide adequate capacity at each stage of construction. Before temporary utility availability, provide trucked-in services.
   5. Obtain construction easements necessary to bring temporary and/or permanent utilities to site.
   6. Use qualified personnel for installation and maintenance of temporary facilities. Locate temporary utilities where they will serve Project adequately and result in minimum interference with the Work of Owner or other Contractors on Project Site. Relocate and modify temporary utilities as required.
   7. Pay cost and use charges for temporary and permanent utilities until Substantial Completion has been granted by Owner.

B. Prepare schedule indicating dates for implementation and termination of each temporary utility. At earliest feasible time, change over from use of temporary service to use of permanent service.

C. Keep temporary utilities clean and neat in appearance. Operate in safe and efficient manner. Take necessary fire prevention measures. Do not overload utilities, or allow them to interfere with progress of The Work. Do not allow hazardous, dangerous or unsanitary conditions, or public nuisances to develop or persist on Project site.

D. Limit availability of temporary utilities to essential and intended uses to reduce waste and abuse.

E. Maintain temporary utilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on 24-hour day 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.

F. Remove each temporary utility and control when need has ended, or when replaced by permanent utility, but not later than Substantial Completion. Complete permanent construction that may have been delayed because of interference with temporary utility. Repair damaged work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

G. Materials and facilities that make up temporary utilities are property of Contractor.

1. By Substantial Completion, clean and renovate permanent utilities used during construction period, including but not limited to:
    a. Replace air filters and clean inside of ductwork and housings.
    b. Replace significantly worn parts and parts subjected to unusual operating conditions.
    c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

1.03 TEMPORARY ELECTRICITY

A. Cost: By Contractor.

B. Provided weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

1.04 TEMPORARY FIRE PROTECTION

A. Cost: By Contractor.

B. Install and maintain temporary fire protection facilities of types needed to protect against predictable and controllable fire losses. At a minimum, provide and maintain in working order two Standard UL Labeled ABC all-purpose 10 lb fire extinguishers. Do not incorporate these extinguishers into final Project.
    1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher.
    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 fighting fires.
    4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
    5. At earliest feasible date in each area of Project, complete installation of permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

1.05 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Install and operate temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

D. Permanent building lighting may be utilized during construction.

1.06 TEMPORARY HEATING AND COOLING

A. Cost of Energy: By Contractor.

B. Install and operate temporary heating, cooling, and ventilating units including fuel, temporary piping, fittings, wiring, and connections necessary to provide environmental conditions specified for various portions of the Work. Coordinate ventilation requirements to produce ambient conditions required and reduce consumption of energy.

C. Repair damage to building and contents caused by cold, heat, dampness, and/or heating, cooling, and ventilating equipment. Select equipment that will not have harmful effect on completed installations or on elements being installed.

D. Provide heating and cooling devices and heat as needed to maintain specified conditions for construction operations.
    1. Operate equipment according to equipment manufacturer's instructions.
    2. Provide fresh air ventilation required by equipment manufacturer.
    3. Keep temperature of fuel containers stabilized.
    4. Secure fuel containers from overturning.
    5. Operate equipment away from combustible materials.

E. Maintain minimum ambient temperature of between 50 and 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

F. Existing facilities shall not be used.

G. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.

H. Do not operate system when work causing air-borne dust is occurring or when dust caused by such work is present without installation of temporary filtering system approved by Architect.

I. Operate system at no cost to Owner, including cost of fuel.

J. Assume all responsibility and risk for operation of system.

K. Return permanent mechanical equipment to 'like-new' condition for Substantial Completion Inspection.

1.07 TEMPORARY WATER SERVICE

A. Cost of Water Used: By Contractor.

B. Connect to existing water source.
   1. Exercise measures to conserve water.
   2. Provide separate metering and reimburse Owner for cost of water used.

C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.08 TEMPORARY TELEPHONES

A. Contractor will, at a non-reimbursable cost and expense, provide temporary telephone service for all personnel engaged in construction activities, throughout construction period.

B. Contractor will pay for Local calls. Party making call will pay for long-distance and toll calls.

C. At each telephone, post list of important telephone numbers.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 5813
TEMPORARY PROJECT SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project identification sign.

1.02 QUALITY ASSURANCE

A. Design sign and structure to withstand 50 miles/hr wind velocity.

1.03 SUBMITTALS

A. Shop Drawing: Show content, layout, lettering, color, foundation, structure, sizes and grades of members.

PART 2 PRODUCTS

2.01 PROJECT IDENTIFICATION SIGN

A. Provide a temporary project Identification sign:
   1. Sign may be free-standing or attached to temporary field office or storage shed.
   2. No other signs or advertisements are allowed on building site.
   3. Sign will be no larger than 4 feet by 8 feet and include following information:
      a. Project Name as shown in Contract Documents.
      b. Contractor’s name.
      c. Architectural firm name.
   4. Owner reserves the right to remove and/or take possession of any project identification sign.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install project identification sign within 30 days after date fixed by Notice to Proceed.

B. Erect at designated location.

C. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

D. Install sign surface plumb and level, with butt joints. Anchor securely.

E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

A. Maintain signs and supports clean, repair deterioration and damage.

3.03 REMOVAL

A. Remove signs, framing, supports, and foundations at completion of Project and restore the area.

END OF SECTION

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SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations.

1.02 SUBMITTALS

A. As indicated in technical sections in accordance with Section 01 3000.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.

B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.

C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

B. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for complete installation and for intended use and effect.

C. Provide interchangeable components of the same manufacturer for components being replaced.

D. Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on surfaces of products that will be exposed to view in occupied spaces or on building exterior.

1. Locate required product labels and stamps on concealed surface or, where required for observation after installation, on accessible surface that is not conspicuous.
2. Provide permanent nameplates on items of service-connected or power-operated equipment. Locate on easily accessible surface that is inconspicuous in occupied spaces. Nameplate will contain following information and other essential operating data:
    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Where Specifications require compliance with performance requirements, provide products that comply with these requirements and are recommended by manufacturer for application described. General overall performance of product is implied where product is specified for specific application. Manufacturer's recommendations may be contained in published product literature, or by manufacturer's certification of performance.

C. Where specifications only require compliance with an imposed code, standard, or regulation, select product that complies with standards, codes or regulations specified.

D. Where Specifications require matching an established Sample, Architect's decision will be final on whether proposed product matches satisfactorily. Where no product available within specified category matches satisfactorily nor complies with other specified requirements, refer to Architect.

E. Where specified product requirements include phrase "...as selected from manufacturer's standard colors, patterns, textures..." or similar phrase, select product and manufacturer that comply with other specified requirements. Architect will select color, pattern, and texture from product line selected.

F. Remove and replace products and materials not specified in Contract Documents but installed in the Work with specified products and materials at no additional cost to Owner and for no increase in Contract time.

G. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

H. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. Product selection is governed by Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include:
   1. Substitutions and Equal Products:
      a. Substitutions for specified products and systems, as defined in the Uniform Commercial Code, are not acceptable. However, equal products may be approved upon compliance with Contract Document requirements.
      b. Approved Products / Manufacturers / Suppliers / Distributors / Fabricators / Installers:
   2. Acceptable Products / Manufacturers / Suppliers / Installers:
      a. Use ‘Equal Product Approval Request Form’ to request approval of equal products, manufacturers, or suppliers before bidding or before installation, as noted in individual Sections.
   3. Quality / Performance Standard Products / Manufacturers:
      a. Products / manufacturers used shall conform to Contract Document requirements.
   4. Comparable Product Requests:
      a. Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles:
         1) Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
         2) Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
            (a) Form of Approval: As specified in Division 01 Section "Submittal Procedures."
            (b) Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
         3) Submit five copies of each required submittal unless otherwise required. Architect will return three copies marked with action taken and with corrections or modifications required.

4) Submit electronic files: PDF. Architect will return a PDF copy marked with action taken and with corrections or modifications required.

3.02 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage or theft; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Schedule delivery to reduce long-term storage at site and to prevent overcrowding of construction spaces.

E. 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.

F. Transport and handle products in accordance with manufacturer's instructions.

G. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

H. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

I. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

J. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

A. Provide protection of stored materials and products against theft, casualty, or deterioration.

B. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

C. Store and protect products in accordance with manufacturers' instructions.

D. Store with seals and labels intact and legible.

E. Arrange storage of materials and products to allow for visual inspection for the purpose of determination of quantities, amounts, and unit counts. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

F. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

G. Store heavy materials away from Project structure so supporting construction will not be endangered.

H. For exterior storage of fabricated products, place on sloped supports above ground.

I. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

J. Comply with manufacturer's warranty conditions, if any.

K. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

L. Prevent contact with material that may cause corrosion, discoloration, or staining.

M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

3.04 NON-CONFORMING WORK

A. Non-conforming work as covered in General Conditions applies, but is not limited, to use of non-specified products or manufacturers.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Surveying for laying out the work.

C. Cleaning and protection.

D. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

A. Section 01 7800 - Closeout Submittals: Project record documents, operation and maintenance data, warranties, and bonds.

1.03 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.04 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.

G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Minimize amount of bare soil exposed at one time.
   2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.
   3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
   4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. At All Times: Excessively noisy tools and operations will not be tolerated inside the building at any time of day; excessively noisy includes jackhammers.
   2. Outdoors: Limit conduct of especially noisy exterior work to [_____].
   3. Indoors: Limit conduct of especially noisy interior work to [_____].

I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

J. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

K. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.

C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and [_____].
   2. Grid or axis for structures.
   3. Building foundation, column locations, ground floor elevations, and [_____].

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations to extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents. Notify Architect of conflicts between Manufacturer's installation instructions and Contract Document requirements.

B. Provide attachment and connection devices and methods necessary for securing Work. Secure work true to line and level. Anchor each product securely in place, accurately located, and aligned with other Work. Allow for expansion and building movement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain best visual effect. Refer questionable choices to Architect for final decision.

G. Install each component during weather conditions and Project status that will ensure best possible results. Isolate each part of completed construction from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to reduce necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not shown, install individual components at standard mounting heights recognized within the industry or local codes for that application. Refer questionable mounting height decisions to Architect for final decision.

3.05 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. Perform whatever cutting and patching is necessary to:
   1. Complete the work.
   2. Fit products together to integrate with other work.
   3. Provide openings for penetration of mechanical, electrical, and other services.
   4. Match work that has been cut to adjacent work.
   5. Repair areas adjacent to cuts to required condition.
   6. Repair new work damaged by subsequent work.
   7. Remove samples of installed work for testing when requested.
   8. Remove and replace defective and non-complying work.

C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

F. Restore work with new products in accordance with requirements of Contract Documents.

G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

I. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Keep site and adjoining streets reasonably clean. If necessary, sprinkle rubbish and debris with water to suppress dust.

E. During handling and installation, protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from soiling, damage, or deterioration until Substantial Completion.

F. Clean and maintain completed construction as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure ability to operate without damaging effects.

G. Organ Chamber:
   1. Clean debris from inside Organ Chamber and leave dust free before organ speakers are installed.

H. Supervise construction activities to ensure that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

I. Before and during application of painting materials, clear area where such work is in progress of debris, rubbish, and building materials that may cause dust. Sweep floors and vacuum as required and take all possible steps to keep area dust free.

J. Clean exposed surfaces and protect as necessary to avoid damage and deterioration.

K. Place extra materials of value remaining after completion of associated work have become Owner's property as directed by Owner or Architect.

L. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.09 FINAL CLEANING

A. Execute final cleaning after Substantial Completion but before making final application for payment.
   1. Clean areas to be occupied by Owner prior to final completion before Owner occupancy.

B. Use cleaning materials that are nonhazardous.

C. Comply with individual manufacturer's cleaning instructions.

D. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

E. Clean each surface or unit to condition expected in normal, commercial building cleaning and maintenance program, including but not limited to:
   1. Interior Cleaning:
      a. Exercising care not to scratch glass.
      b. Remove marks, stains, fingerprints and dirt.
      c. Clean and polish woodwork and finish hardware.
      d. Clean plumbing fixtures and tile work. Remove spots, soil or paint.
      e. Clean surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean light fixtures and lamps.
      f. Clean other fixtures and equipment and remove stains, paint, dirt, and dust.
      g. Remove temporary floor protection and clean floors.
   2. Exterior Cleaning:
      a. Exercising care not to scratch glass.
      b. Remove marks, stains, and dirt from exterior surfaces.
      c. Clean and polish finish hardware.
      d. Remove temporary protection systems.
      e. Clean dirt, mud, and other foreign material from paving and sidewalks.
      f. Clean drop inlets, through-curb drains, and other drainage structures.
      g. Remove trash, debris, and foreign material from landscaped areas.

F. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

G. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

H. Clean filters of operating equipment.

I. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and [_____].

J. Clean site; sweep paved areas, rake clean landscaped surfaces.

K. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.10 CLOSEOUT PROCEDURES

A. Closeout process consists of three specific project closeout inspections. Contractor shall plan sufficient time in construction schedule to allow for required inspections before expiration of Contract Time.

B. Contractor shall conduct his own inspections of The Work and shall not request closeout inspections until The Work of the contract is reasonably complete and correction of obvious defects or omissions are complete or imminent.

C. Date of Substantial Completion shall not occur until completion of construction work, unless agreed to by Architect and included on Certificate of Substantial Completion.

D. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect and Owner.

E. Preliminary Closeout Review:
   1. When Architect, Owner and Contractor agree that project is ready for closeout, Pre-Substantial Inspection shall be scheduled. Preparation of floor substrate to receive carpeting and any work which could conceivably damage or stain carpet must be completed, as carpet installation will be scheduled immediately following this inspection.
   2. Prior to this inspection, completed test and evaluation reports for HVAC system and font, where one occurs, are to be provided to Project Manager, Architect, and applicable consultants.
   3. Architect and his appropriate consultants, together with Contractor and mechanical, plumbing, fire protection, and electrical sub-contractors shall conduct a space by space and exterior inspection to review materials and workmanship and to demonstrate that systems and equipment are operational.
      a. Punch list of items requiring completion and correction will be created.
      b. Time frame for completion of punch list items will be established, and date for Substantial Completion Inspection shall be set.

F. Substantial Completion Inspection:
   1. When Architect, Owner and Contractor agree that project is ready for Substantial Completion, an inspection is held. Punch list created at Pre-Substantial Inspection is to be substantially complete.
   2. Prior to this inspection, Contractor shall discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups and similar elements.
   3. Architect, Owner and Contractor review completion of punch list items. When Owner and Architect confirm that Contractor has achieved Substantial Completion of The Work, Owner, Architect and Contractor will execute Certificate of Substantial Completion that contains:
      a. Date of Substantial Completion.
      b. Punch List Work not yet completed, including seasonal and long lead items.
      c. Amount to be withheld for completion of Punch List Work.
      d. Time period for completion of Punch List Work.
      e. Amount of liquidated damages set forth in Supplementary Conditions to be assessed if Contractor fails to complete Punch List Work within time set forth in Certificate.
   4. Contractor shall present Closeout Submittals to Architect and place tools, spare parts, extra stock, and similar items required by Contract Documents in locations as directed by Facilities Manager.

G. Final Acceptance Meeting:
   1. When punch list items except for any seasonal items or long lead items which will not prohibit occupancy are completed, Final Acceptance Meeting is held.

2. Owner, Architect and Contractor execute Owner's Project Closeout - Final Acceptance form, and verify:
   a. All seasonal and long lead items not prohibiting occupancy, if any, are identified, with committed to completion date and amount to be withheld until completion.
   b. Owner's maintenance personnel have been instructed on all system operation and maintenance as required by the Contract Documents.
   c. Final cleaning requirements have been completed.
3. If applicable, once any seasonal and long lead items are completed, Closeout Inspection is held where Owner and Architect verify that The Work has been satisfactorily completed, and Owner, Architect and Contractor execute Closeout portion of the Project Closeout - Final Acceptance form.
4. When Owner and Architect confirm that The Work is satisfactorily completed, Architect will authorize final payment.

3.11 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.

C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

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SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Methods of trash/waste disposal that are not acceptable are:
   1. Burning on the project site.
   2. Burying on the project site.
   3. Dumping or burying on other property, public or private.
   4. Other illegal dumping or burying.

D. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

A. Asphalt Pavement, Brick, and Concrete (ABC) Rubble: Rubble that contains only weathered (cured) asphalt pavement, clay bricks and attached mortar normally used in construction, or concrete that may contain rebar. The rubble shall not be mixed with, or contaminated by, another waste or debris.

B. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

C. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

D. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

E. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

F. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

B. Meetings: Discuss trash/waste management goals and issues at project meetings.
   1. Prebid meeting.
   2. Preconstruction meeting.
   3. Regular job-site meetings.

C. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
   1. Provide containers as required.
   2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
   3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

D. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

E. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.

B. Operation and maintenance data.

C. Warranties and bonds.

D. Maintenance materials.

1.02 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data.

C. Individual Product Sections: Warranties required for specific products or Work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. Do not use record documents for construction purposes:
   1. Protect from deterioration and loss in secure, fire-resistive location.
   2. Provide access to record documents for Architect's reference during normal working hours.

B. Maintain clean, undamaged set of Drawings:
   1. Mark set to show actual installation where installation varies from the Work as originally shown.
   2. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   3. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work.
   4. Mark new information that is important to Owner, but was not shown on Drawings.
   5. Note related Change Order numbers where applicable.

C. As Built Record Drawings:
   1. As required in agreement with the Owner:
      a. Architect will provide two full-size sets of prints of the As Built Record Drawings to the Facilities Management Office, printed from the updated AutoCAD drawing files or updated Revit model files, as specified by Owner, that have been modified to show actual dimensions and location of equipment, material, utility lines, and other work as actually constructed, based upon information provided by Contractor. Architect will submit updated As Built Record Drawings in PDF (ISO32000 format) to Owner.
      b. Architect will submit following:
         1) Updated AutoCAD as built record drawing files with associated plot style tables or Revit as built record model files, as specified by Owner.
         2) Revit Model O&M lifecycle requirements to be tracked by Facility Manager.

D. Maintain on site one set of the following record documents; record actual revisions to the Work:
   1. Drawings.
   2. Specifications.
   3. Addenda.
   4. Change Orders and other modifications to the Contract.
   5. Reviewed shop drawings, product data, and samples.
   6. Manufacturer's instruction for assembly, installation, and adjusting.

E. Ensure entries are complete and accurate, enabling future reference by Owner.

F. Store record documents separate from documents used for construction.

G. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

E. General:
   1. Include closeout submittal documentation as required by Contract Documentation.
   2. Include workmanship bonds, final certifications, equipment check-out sheets, and similar documents.
   3. Releases enabling Owner unrestricted use of The Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   4. Include Project photographs, damage or settlement survey, and similar record information required by Contract Documents.
   5. Submittal Format:
      a. Digital copies unless otherwise noted, required for each individual specification section that include ‘Closeout Submittals’.
      b. Include only closeout submittals as defined in individual specification section as required in Contract Documents.

F. Project Manual:
   1. Copy of complete Project Manual including Addenda, Modifications as defined in General Conditions, and other interpretations issued during construction:
      a. Mark these documents to show variations in actual Work performed in comparison with text of specifications and Modifications.
      b. Show substitutions, selection of options, and similar information, particularly on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

G. Maintenance Contracts:
   1. Digital format only.

H. Operations and Maintenance Data:
   1. Digital format only:
      a. Cleaning instructions.
      b. Maintenance instructions.
      c. Operations instructions.
      d. Equipment list.
      e. Parts list.

I. Warranty Documentation:
   1. Digital format of final, executed warranties.

J. Record Documentation:

1. Digital format only.
    a. Certificate of Occupancy
    b. Certifications.
    c. Color and pattern selections
    d. Design Data.
    e. Geotechnical Evaluation Reports (soils reports).
    f. Manufacture Reports.
    g. Manufacturer's literature or cut sheets.
    h. Shop Drawings.
    i. Source Quality Control.
    j. Special Procedures.

K. Testing and Inspection Agency Reports.
    1. Testing and Inspection Reports.

L. Software:
    1. Audio and Video System software, programming and set-files.

M. Irrigation Plan.
    1. Laminated and un-laminated reduced sized hard copies.

N. Landscape Management Plan (LMP):
    1. Irrigation Section:
        a. Submittal Format: Digital format and hard copy of each.
        b. Documentation required by sections under 32 8000 Heading: ‘Irrigation’.
    2. Landscaping Section:
        a. Submittal Format: Digital format and hard copy of each.
        b. Documentation required by sections under 32 9000 Heading: ‘Planting’.

3.03 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

F. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers. Provide copy of electronic manual as requested by owner.

G. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

H. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

I. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

3.04 MAINTENANCE MATERIAL SUBMITTALS

A. Submit item(s) required by Section 01 3000 - Administrative Requirements and as defined in individual specification sections if required in Contract Documents. Items may be provided at completion of Work or with Closeout Submittals.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete anchors.

C. Concrete reinforcement.

D. Concrete curing.

1.02 REFERENCE STANDARDS

A. ACI CODE-318 - Building Code Requirements for Structural Concrete and Commentary; 2019 (Reapproved 2022).

B. ACI PRC-302.1 - Guide to Concrete Floor and Slab Construction; 2015.

C. ACI PRC-304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete; 2000 (Reapproved 2009).

D. ACI PRC-305 - Guide to Hot Weather Concreting; 2020.

E. ACI PRC-306 - Guide to Cold Weather Concreting; 2016.

F. ACI PRC-308 - Guide to External Curing of Concrete; 2016.

G. ACI PRC-347 - Guide to Formwork for Concrete; 2014 (Reapproved 2021).

H. ACI SPEC-117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

I. ACI SPEC-301 - Specifications for Concrete Construction; 2020.

J. ANSI/NFSI B101.1 - Test Method For Measuring Wet SCOF Of Common Hard-Surface Floor Materials; 2009.

K. ANSI/NFSI B101.3 - Test Method For Measuring Wet DCOF Of Common Hard-Surface Floor Materials; 2012.

L. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished; 2018.

M. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

N. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2021a.

O. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

P. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars; 2022.

Q. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2014.

R. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

S. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2017.

T. ASTM C33/C33M - Standard Specification for Concrete Aggregates; 2018.

U. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens; 2021.

V. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete; 2023.

W. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

X. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

Y. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete; 2020.

Z. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method; 2016.

AA. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete; 2019.

BB. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete; 2022.

CC. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing; 2017.

DD. ASTM C779/C779M - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces; 2019.

EE. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures; 2016.

FF. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2021.

GG. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

HH. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures; 2020.

II. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2018.

JJ. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars; 2021.

KK. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.

LL. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2020.

MM. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

NN. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete; 1992.

OO. COE CRD-C 513 - Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops; 1974.

PP. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop; 1974.

QQ. COE CRD-C 621 - Handbook for Concrete and Cement Standard Specification for Packaged, Dry; 1997.

RR. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements; 2015.

SS. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements; 2016.

1.03 SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
   1. For curing compounds, provide data on method of removal in the event of incompatibility with floor covering adhesives.
   2. For chemical-resistant waterstops, provide data on ASTM D471 test results.

3. Printed application instructions for form release agents.

B. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI SPEC-301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI CODE-318, Chapter 5 - Concrete Quality, Mixing and Placing.

C. Shop Drawings:
   1. Show dimensioned locations of anchor bolts for hold-down anchors and columns.
   2. Show reinforcement and all necessary bending diagrams and reinforcing steel list, and construction joint locations.
   3. Provide bar schedules and bending details.
   4. Show all formwork for concrete surfaces which are to remain exposed in the finished work.
   5. Joint layout plan for control and expansion joints for sidewalks, curbs, and gutters for written approval before starting work on this Section.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. Ready-Mix Supplier:
   1. Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use of Owner or its representatives. Tickets shall show following:
      a. Name of ready-mix batch plant.
      b. Serial number of ticket.
      c. Date and truck number.
      d. Name of Contractor.
      e. Name and location of Project.
      f. Specific class or designation of concrete conforming to that used in Contract Documents.
      g. Amount of concrete.
      h. Amount and type of cement.
      i. Total water content allowed by mix design.
      j. Amount of water added at plant.
      k. Sizes and weights of sand and aggregate.
      l. Time loaded.
      m. Type, name, manufacturer, and amount of admixtures used.
   2. Provide certificates with supporting testing reports verifying compliance with Contract Document requirements and that materials provided are from single source for following:
      a. Cement.
      b. Aggregate.
      c. Fly Ash.

F. Test Reports: Submit report for each test or series of tests specified.

G. Test Reports: Submit termite-resistant sheet manufacturer's summary of independent laboratory and field testing for effectiveness in subterranean termite exclusion.

H. Manufacturer's Installation Instructions: For concrete accessories and form release agents, indicate installation procedures and interface required with adjacent construction.

I. Manufacturer’s Reports:
   1. Provide Manufacturer's performance and testing data for following:
      a. Each admixture used.

J. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

K. Closeout Submittals:
   1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
      a. Record Documentation:

1) Pour Reports:
   (a) Provide report that records following information:
      (1) Date and time of start of pour, Date and time of end of pour, and Date and time of end of finishing procedures.
      (2) Temperature at start of pour, Temperature at end of Pour, and Maximum temperature during performance of finishing procedures.
      (3) Wind speed at start of pour, Wind speed at end of pour, and Maximum wind speed during performance of finishing procedures.
      (4) Humidity at start of pour, Humidity at end of pour, and High and low humidity during performance of finishing procedures.
      (5) Cloud cover at start of pour, Cloud cover at end of pour, and High and low cloud cover during performance of finishing procedures.
      (6) Screeding method and equipment used.
      (7) Saw cut method and equipment used.
2) Testing and Inspection Reports:
   (a) Testing Agency Testing and Inspecting Reports of concrete.
3) Warranty. Submit rapid concrete drying or MVRA manufacturer warranties for concrete moisture vapor emission induced flooring failure and adhesion; ensure both have been completed in project's name and registered with manufacturer.
   (a) Provide warranty to cover cost of flooring failures due to moisture migration from slabs for life of concrete. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.
   (b) Provide stand-alone adhesion warranty matching duration of flooring adhesive or primer manufacturer's material defect warranty.

L. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 DEFINITIONS

A. Cold Weather, as referred to in this Section, is four (4) hours with ambient temperature below 40 deg F in twenty-four (24) hour period.

B. Floor Flatness (FF): Rate of change in elevation of floor over 12 inches section.

C. Floor Levelness (FL): Measures difference in elevation between two points which are 10 feet apart.

D. Hot Weather, as referred to in this Section, is ambient air temperature above 100 deg F or ambient air temperature above 90 deg F with wind velocity 8 mph or greater.

1.05 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.
   1. Maintain one copy of each document on site.

B. Qualifications: Requirements of Section 01 4000 applies, but is not limited to following:
   1. Installers and Installation Supervisor:
      a. ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
      b. Certification for National Ready Mixed Concrete Association (NRMCA).
   2. Ready-Mix Supplier:
      a. Comply with ASTM C94/C94M requirements and be certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities".
   3. Testing Agencies:
      a. Independent agency qualified according to ASTM C1077 and ASTM E329.
         1) Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technicians, Grade I according to ACI CP-1 or equivalent certification program.

2) Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be ACI-certified Concrete Laboratory Testing Technician - Grade II.

C. Testing and Inspection:
   1. Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
   2. Owner will provide Testing and Inspection on concrete:
      a. Owner will employ testing agencies to perform testing and inspection on concrete as specified in Field Quality Control in Part 3 of this specification:
         1) Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform the Work in strict accordance with requirements of Contract Documents and perform contractor testing and inspection.

D. Follow recommendations of ACI PRC-305 when concreting during hot weather.

E. Follow recommendations of ACI PRC-306 when concreting during cold weather.

F. Scheduling:
   1. Notify Testing Agency and Architect twenty-four (24) hours minimum before placing concrete.
   2. Schedule pre-installation conference prior to placing of footings, installation of foundation forms and reinforcing steel, and installation of anchors, dowels, inserts, and block outs in foundation walls and slabs.

1.06 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 CONCRETE FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI PRC-347 to provide formwork that will produce concrete complying with tolerances of ACI SPEC-117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
   2. Form Facing for Exposed Finish Concrete: Steel.
   3. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
      a. Vertical earth cuts may be used for footings provided the footing width and length are 6" wider and longer than scheduled.
   4. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   5. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 CONCRETE ANCHORS

A. General:
   1. Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Contract Drawings.
      a. Install hot-dipped or stainless steel anchor bolts to attach wood sill plates to foundation with 1/4 inch by 3 inch x 3 inch minimum adjustable plate washers and standard cut washers between wood sill plates and nuts.
      b. Nut: Conform to requirements of ASTM A563, Grade A, Hex.

c. Conform to requirements of ASTM F3125/F3125M for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.

2. Threaded rod for adhesive anchors and cast-in anchors:
   a. Conform to requirements of ASTM A307, Grade A or ASTM F1554 Grade 36 unless indicated otherwise on Contract Drawings.
3. Cast-In-Place Anchor Bolts:
   a. J-Bolts:
      1) Non-headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
      2) Anchor hook to project 2 inches minimum including bolt diameter.
   b. Headed Bolts:
      1) Headed type threaded 2 inches minimum conforming to requirements of ASTM F1554, Grade A.
4. Headed Concrete Anchor Studs:
   a. Composed of low carbon steel meeting requirements of ASTM A108.
   b. Tensile Strength: 61,000 psi minimum.
   c. Yield Strength: 49,000 psi minimum.
5. Deformed Bar Anchors:
   a. Manufactured in accordance with requirements of ASTM A1064/A1064M.
   b. Tensile Strength: 80,000 psi minimum.
   c. Yield Strength: 70,000 psi minimum.
6. Reinforcing Bars:
   a. Composed of deformed carbon steel meeting requirements of ASTM A615/A615M, Grade 60 (field bent bars may be Grade 40)
7. Adhesive Anchors:
   a. Products shall have current ESR conforming to current ICC Acceptance Criteria ICC-ES AC308 for concrete.
   b. Rod diameter and embedment length as indicated on Contract Drawings.
   c. Acceptable Products:
      1) HIT-RE 500V3 with SafeSet Epoxy Adhesive by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
      2) Pure 110+ by DeWalt Anchors & Fasteners, Towson, MD, www.anchors.dewalt.com.
      3) SET-3G Epoxy by Simpson Strong-Tie Co., Pleasanton, CA www.strongtie.com.com.
      4) Equal as approved by Architect before installation. See Section 01 6000.
8. Expansion Anchors:
   a. Products shall have current ESR conforming to current ICC Acceptance Criteria ICC-ES AC193 for concrete.
   b. Acceptable Products:
      1) KWIK Bolt TZ2 Expansion Anchor by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
      2) Power-Stud +SD2 by DeWalt Anchors & Fasteners, Brewster, NY, www.ancors.dewalt.com.
      3) Strong-Bolt 2 by Simpson Strong-Tie Co., Pleasanton, CA www.strongtie.com.
      4) Equal as approved by Architect before installation. See Section 01 6000.
9. Screw Anchors:
   a. Provide anchors with length identification markings conforming to ICC Acceptance Criteria ICC-ES AC193 for concrete.
   b. Type Two Acceptable Products:
      1) KWIK KH-EZ by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
      2) Screw-Bolt+ by DeWalt Anhors & Fasteners Inc., Towson, MD, www.anchors.dewalt.com.

3) Titen HD by Simpson Strong Tie Co, Pleasanton, CA www.strongtie.com.
4) Equals as approved by Architect through shop drawing submittal before installation. See Section 01 6000.

2.03 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), except dowels that are to be field bent, Grade 40 minimum.
1. Type: Deformed billet-steel bars.
2. Finish: Unfinished, unless otherwise indicated.
3. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

B. Epoxy Coated Reinforcement Steel Bars:
1. Bars shall have grade identification marks and conform to ASTM A615/A615M with coating conforming to ASTM A775/A775M and comply with requirements of ACI 318.21.2.5:
a. Bar supports shall be completely coated with epoxy or vinyl, compatible with both concrete and epoxy coating on bars. Coating shall be at least 1/8 inch thick at tips.
b. Tie wire shall be nylon coated.
2. Actual yield strength based on mill tests does not exceed specified yield strength by more than 18,000 psi and Ratio of actual ultimate stress (at breaking point) to actual tensile yield stress shall not be less than 1.25.
a. Grade 60 minimum, except dowels that are to be field bent, Grade 40 minimum.
3. Bars shall be deformed type.
4. Bars shall be free of heavy rust scales and flakes, or other bond-reducing coatings.

C. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
1. Form: Coiled Rolls.
2. WWR Style: 6 x 6 - W1.4 x W1.4..

D. Reinforcement Accessories:
1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
2. Bar Supports:
a. Concrete masonry units or bricks are not acceptable.
b. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with legs which are plastic protected (CRSI, Class 1) or stainless steel protected (CSRI, Class 2).
c. Acceptable Products:
1) Concrete 'dobies' or blocks wired to reinforcing.
2) Manufactured chairs with 4 sq inch bearing surface on sub-grade, or other feature to prevent chair from being pushed into sub-grade or damaging vapor retarder under slabs on grade.
3. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
4. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

2.04 CONCRETE MATERIALS

A. Performance:
1. Design Criteria: Conform to requirements of ASTM C94/C94M unless specified otherwise:
2. Capacities:
a. For testing purposes, following concrete strengths are required:
1) At 7 days: 70 percent minimum of 28 day strengths.
2) At 28 days: 100 percent minimum of 28 day strengths.

B. Cement: ASTM C150/C150M, Type I - Normal Portland type.
1. Acquire cement for entire project from same source.

C. Concrete mix design: Submit mix designs to meet following requirements:

1. Unexposed Interior Concrete:
   a. For unexposed interior concrete slabs on grade and as otherwise required by the contract drawings.
   b. 3500 psi (24.13 MPa) minimum at twenty-eight (28) days.
   c. Water / Cementitious Material: 0.45 maximum by weight.
2. Exterior and Attic Concrete Exposed to Freeze/Thaw:
   a. For exterior concrete exposed to freeze/thaw cycles and deicing salts or where soils are "corrosive" and as otherwise required by the contract drawings.
   b. 4500 psi (31.03 MPa) minimum at twenty-eight (28) days.
   c. Water / Cementitious Material: 0.40 maximum by weight.
   d. Use twenty-five (25) percent Class F fly ash as part of cementitious material.
   e. Mix Type E should be used for all exterior concrete exposed to freeze/thaw cycles and deicing salts, unless dictated otherwise by site conditions.
   f. For concrete paving, use mix design based upon use of 1-1/2 inches coarse aggregate (about 15 percent).
3. Air Entrainment: Six (6) percent, plus or minus 1-1/2 percent for exterior concrete and foundation walls exposed to freeze/thaw cycles.
4. Do not add water any time during mixing cycle above amount required to meet specified water / cement ratio. No reduction in amount of cementitious material is allowed.
5. Mix design strengths specified are a minimum due to exposure to sulfates, chlorides, freeze/thaw, water, etc. Refer to the structural drawings for additional concrete strength requirements. The most stringent requirements should be met.

D. Slump:
1. 4 inch (100 mm) slump maximum before addition of high range water reducer.
2. 8 inch (200 mm) slump maximum with use of high range water reducer.
3. Slump not required for Mix Type G.

E. General:
1. Submit a letter on quarry's letterhead that certifies all aggregate for concrete complies with the requirements of this section. Material certificates which are submitted shall be signed by both the materials producer and the contractor, certifying that materials comply with or exceed requirements specified herein to the Architect, Civil and Structural Engineering Consultant and the Independent Testing Laboratory for review and approval.
2. Aggregates for all concrete shall come from a quarry that is DOT approved and meets or exceeds durability Class I aggregate. The quarry shall submit a letter to Engineer that certifies that all aggregate complies with DOT requirements for durability. Aggregate not meeting DOT durability requirements shall not be used.

F. Fine and Coarse Aggregates: ASTM C33/C33M.
1. Acquire aggregates for entire project from same source.

G. Fly Ash: ASTM C618, Class C or F.
1. Not to exceed twenty-five (25) percent of weight of cementitious materials.

H. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.05 ADMIXTURES

A. No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Mix design shall show proposed admixtures, amount, usage instructions, and justification for proposed use. Do not use any admixtures without Architect's written approval.
1. Chemical accelerator or retarder may be used if necessary to meet environmental conditions and construction schedules.

C. Alkali-Silica Reactivity Inhibiting Admixture:

1. Specially formulated lithium nitrate admixture for prevention of alkali-silica reactivity (ASR) in concrete. Admixture must have test data indicating conformance to ASTM C1293.
2. Manufacturer: As approved by Architect before use. See Section 01 6000.

D. Viscosity Modifying Admixture (VMA):
1. Liquid admixture used to optimize viscosity of Self-Consolidating Concrete (SCC). Subject to compliance with requirements, provide following at dosage rates per manufacturer's recommendations.
2. Manufacturer: As approved by Architect before use. See Section 01 6000.

E. Air Entraining Admixture: ASTM C260/C260M.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

F. High Range Water Reducing Admixture: ASTM C494/C494 Type F.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

G. High Range Water Reducing and Retarding Admixture (Superplasticizer): ASTM C494/C494M Type G.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

H. Water Reducing Admixture: ASTM C494/C494M Type A.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

I. Water Reducing and Accelerating Admixture: ASTM C494/C494 Type E.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

J. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

K. Accelerating Admixture: ASTM C494/C494M Type C.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

L. Retarding Admixture: ASTM C494/C494M Type B.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

M. Shrinkage Reducing Admixture: ASTM C494/C494M Type S.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

N. Non-Chloride, Non-Corrosive Accelerating Admixture: ASTM C494/C494M Type C or E.
1. Manufacturer: As approved by Architect before use. See Section 01 6000.

O. Corrosion Inhibiting Admixture: ASTM C494/C494M Type C and ASTM C1582/C1582M.
1. Liquid admixture to inhibit corrosion of steel reinforcement in concrete by introducing proper amount of anodic inhibitor. Admixture shall contain thirty (30) percent calcium nitrite solution and shall be used where called for in specifications or on drawings.
2. Manufacturer: As approved by Architect before use. See Section 01 6000.
3. Potable Water Contact Approval: National Science Foundation (NSF) certification for use on structures holding potable water, based on testing in accordance with NSF 61 and NSF 372.
4. Manufacturer: As approved by Architect before use. See Section 01 6000.

2.06 ACCESSORY MATERIALS

A. Non-Shrink Cementitious Grout: Premixed compound consisting of nonmetallic aggregate, cement, water reducing and plasticizing agents.
1. Grout: Comply with ASTM C1107/C1107M.
2. Meet following requirements:
a. ASTM C1107/C1107M, Type B or Type C.
b. Corps and Engineers CRD C-621.
c. Compressive strength of 6000 psi (41 MPa) minimum.
3. Manufacturers: As approved by Architect before use. See Section 01 6000.

B. Non-Shrink Epoxy Grout: Moisture-insensitive, two-part; consisting of epoxy resin, non-metallic aggregate, and activator (use on expansion joints of interior slabs on grade of Welfare Services Projects):
   1. Composition: High solids content material exhibiting positive expansion when tested in accordance with ASTM C827/C827M.
   2. 100 percent solids, two-component, moisture-insensitive, semi-rigid epoxy for use as joint filler for saw cut and tooled interior joints.
   3. Self leveling consistency.
   4. Shore A Hardness: 75 to 80.
   5. Meet following minimum criteria:
      a. Tensile Strength: 600 psi (4.2 MPa).
      b. Ultimate Elongation: 35 percent.
   6. Manufacturers: As approved by Architect before use. See Section 01 6000.

C. Semi-Rigid Joint Filler (control joints of interior concrete slabs on grade in warehouse areas of Welfare Services Projects):

2.07 BONDING AND JOINTING PRODUCTS

A. Bonding Agents:
   1. Manufacturers: As approved by Architect before use. See Section 01 6000.

B. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
   1. Manufacturers: As approved by Architect before use. See Section 01 6000.

C. Waterstops (Contractor Option):
   1. Waterstops: PVC, complying with COE CRD-C 572.
      a. Configuration: As indicated on drawings.
      b. Size: As indicated on drawings.
      c. Manufacturers: As approved by Architect before use. See Section 01 6000.
   2. Waterstops: Bentonite and butyl rubber, complying with NSF 61 and NSF 372.
      a. Configuration: As indicated on drawings.
      b. Size: As indicated on drawings.
      c. Manufacturers: As approved by Architect before use. See Section 01 6000.

2.08 CURING MATERIALS

A. Membrane Curing:
   1. Clear water-based, ready-to use membrane curing agent that cures freshly placed concrete, forming effective barrier against moisture loss from concrete surface.
   2. Design Criteria:
      a. Exterior Concrete:
         1) Dissipating or non-dissipating membrane curing agent.
      b. Interior Concrete:
         1) Dissipating membrane curing agent only.
         2) Gradually dissipate after twenty-eight (28) days without leaving stain or discoloring concrete surface.
      c. VOC-compliant compound.
      d. Meet requirements of ASTM C309 and AASHTO M 148, Type 1 or 1-D, Class B.
      e. Interior concrete: containing no mineral spirits, naphtha, or other components detrimental to finish flooring installation.
      f. Maintain ninety-five (95) percent of mix water present in concrete mass after application.
   3. Horizontal and Vertical Cast-In-Place Structural Concrete:
      a. Acceptable Products.
         1) Exterior Concrete:

(a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg. OH www.daytonsuperior.com.
(b) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
(c) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
(d) VOCOMP 20 (do not use when concrete sealer will be applied in areas of freeze/thaw and deicer salts) by W.R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
(e) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
(f) Equal as approved by Architect before use. See Section 01 67000

2) Interior Concrete:
(a) Clear Cure J7WB by Dayton Superior Corporation, Miamisburg. OH www.daytonsuperior.com.
(b) Clear Water Resin by Right Point, Dekalb, IL www.rightpointe.com.
(c) L&M Cure R by L&M Construction Chemicals, Inc. Omaha, NE www.lmcc.com.
(1) 1100-Clear by W. R. Meadows, Inc. Hampshire, IL www.wrmeadows.com.
(d) Equal as approved by Architect before use. See Section 01 6000.

2.09 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section and before concrete is placed.
1. Notify Architect of incorrect dimensions or spot elevations in writing.
2. Do not place concrete until corrections are made and verified.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI SPEC-301. Design and fabricate forms to support all applied loads until concrete is cured and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Concrete Mixing:
1. General:
a. All concrete shall be machine mixed.
b. Water gauge shall be provided to deliver exact predetermined amount of water for each batch.
c. Reliable system must be employed to insure that no less than predetermined amount of cement goes into each batch.
d. Re-tempering partly set concrete will not be permitted.
2. Transit Mix:
a. Transit mix concrete may be used provided it conforms to Specifications and tests herein described and ASTM C94/C94M.

b. Central plant producing concrete and equipment transporting it are suitable for production and transportation of controlled concrete and plant is currently approved by local state DOT.
c. Maximum elapsed time between time of introduction of water and placing shall be one (1) hour.
d. Minimum time of mixing shall be one (1) minute per cubic yard after all material, including water, has been placed in drum, and drum shall be reversed for an additional two (2) minutes.
e. Mixing water shall be added only in presence of Inspecting Engineer or inspector employed by Testing Agency.
f. Trucks shall not be overloaded in excess of rated capacity as recommended by manufacturer.

3. Cold Weather Concreting Procedures:
   a. General Requirements:
      1) Materials and equipment required for heating and protection of concrete shall be approved and available at Project site before beginning cold weather concreting.
      2) Forms, reinforcement, metallic embedments, and fillers shall be free from snow, ice, and frost. Surfaces that will be in contact with newly placed concrete, including subgrade materials, shall be 35 deg F (2 deg C) minimum at time of concrete placement.
      3) Thaw sub-grade 6 inches (150 mm) deep minimum before beginning concrete placement. If necessary, re-compact thawed material.
      4) Use no frozen materials or materials containing ice.
      5) See ACI 306.1 ‘Standard Specification for Cold Weather Concreting’ for additional requirements.
4. Hot Weather Concreting Procedures:
   a. General:
      1) Maximum concrete temperature allowed is 90 deg F (32 deg C) in hot weather.
      2) Cool aggregate and subgrades by sprinkling.
      3) Avoid cement over 140 deg F (60 deg C).
      4) Use cold mixing water or ice.
      5) Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.
      6) See ACI 305.1 ‘Specification for Hot Weather Concreting’ for additional requirements.

E. Surface Preparation:
1. Earthwork Preparation:
   a. Aggregate base and subgrade:
      1) Prepare aggregate base as specified in Section 312323.
      2) Prepare natural soil subgrade as specified in Section 31 2200.
      3) Prepare fill subgrade as specified in Section 31 2323.
2. Concrete Slab Thickness:
   a. Increase thickness of concrete beneath detectable warning panels one inch (25 mm).
3. Inserts, bolts, boxes, templates, pipes, conduits, and other accessories required by Divisions 22, 23, and 26 shall be installed and inspected before placing concrete.
4. Install inserts, bolts, boxes, templates, pipes, conduits, and other accessories furnished under other Sections to be installed as part of work of this Section:
   a. Tie anchor bolts for hold-down anchors and columns securely to reinforcing steel.

F. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
1. Use latex bonding agent only for non-load-bearing applications.

G. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions.

Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.

H. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

I. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

J. Removal:
   1. Remove water and debris from space to be placed.
   2. Vapor Retarder Over Aggregate Base: Install compactible granular fill before placing vapor retarder as indicated on drawings. Do not use sand.

3.03 INSTALLATION OF FORMWORK

A. Forms:
   1. Assemble forms so forms are sufficiently tight to prevent leakage.
   2. Properly brace and tie forms.
   3. Provide temporary cleanouts at base of tall forms if used to facilitate cleaning and inspection.
   4. Make proper form adjustments before, during, and after concreting.
   5. Use new forms, or used forms that have been cleaned of loose concrete and other debris from previous concreting and repaired to proper condition. Use APA Plyform B-B Class I, or APA HDO Plyform B-B Class I, on exposed to view concrete that do not receive a smooth rubbed finish.
   6. Use metal cold joint forms when unable to place concrete for footings, foundations, and slabs in continuous pours.
   7. Provide beveled 2 inch by 4 inch keys where shown on Contract Drawings for tall or heavily loaded walls.

B. Accessories:
   1. General:
      a. Provide for installation of inserts, templates, fastening devices, sleeves, and other accessories to be set in concrete before placing.
      b. Position anchor bolts for hold-down anchors and columns and securely tie in place before placing concrete.
   2. Form Release / Finish Agents:
      a. Film thickness shall be no thicker than as recommended by Manufacturer.
      b. Allow no release / finish agent on reinforcing steel or footings.
   3. Expansion Joints:
      a. Install at joints between floor slab and foundation wall where shown on Drawings.

3.04 PLACING CONCRETE

A. Place concrete in accordance with ACI PRC-304.

B. Place concrete for floor slabs in accordance with ACI PRC-302.1.

C. Notify Architect not less than 24 hours prior to commencement of placement operations.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. General:
   1. Place as soon after mixing as possible.
   2. Deposit as nearly as possible in final position.
   3. No concrete shall be deposited in water.
   4. Placing of concrete shall be continuous until panel or section is complete.

5. Compact concrete in forms by vibrating and other means where required.
    a. Thoroughly consolidate concrete around reinforcing bars (Consolidation not required in concrete around reinforcing bars with Mix Type G).
    b. Use and type of vibrators shall conform to ACI 309.
6. Form vertical surfaces full depth. Do not allow concrete to flow out from under forms in any degree into landscaped areas.
7. Consolidate concrete thoroughly.
8. Do not embed aluminum in concrete.
9. Do not use contaminated, deteriorated, or re-tempered concrete.
10. Avoid accumulation of hardened concrete.
11. Dusting with cement not permitted.

F. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

G. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

3.05 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.

3.06 CURING AND PROTECTION

A. Comply with requirements of ACI PRC-308. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
    1. Normal concrete: Not less than seven days.
    2. High early strength concrete: Not less than four days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:
    1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by membrane curing, water ponding, water-saturated sand, water-fog spray, or saturated burlap.
    2. Slabs and Floors To Receive Adhesive-Applied Flooring: Membrane Cure. Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
    3. Slabs and Floors to Receive Polished Finish: Water cure
    4. Final Curing: Begin after initial curing but before surface is dry.
        a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
        b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.07 POST INSTALLED ANCHORS

A. General:
    1. Drill holes with rotary impact hammer drills using carbide-tipped bits.
    2. Unless otherwise shown on Drawings, drill holes perpendicular to concrete surface.
    3. Perform anchor installation in accordance with Manufacturer’s published instructions.

B. Adhesive Anchors:

1. Clean holes in accordance with Manufacturer's published instructions before installation of adhesive:
    a. Follow Manufacturer's recommendations to ensure proper mixing of adhesive components.
2. Adhesive:
    a. Inject adhesive into holes proceeding from bottom of hole and progressing toward surface so as to avoid introduction of air pockets into adhesive.
    b. Inject sufficient adhesive into hole to ensure that annular gap is filled to surface.
    c. Remove excess adhesive from surface and threads of anchor as necessary.
3. Shim anchors with suitable device to center anchor in hole. Do not disturb or load anchors before Manufacturer's specified cure time has elapsed.
4. Temperature:
    a. Observe Manufacturer's recommendations with respect to installation temperatures for adhesive anchors.
    b. Base material temperatures must be maintained above minimum temperatures allowed by Manufacturer for full required epoxy cure time.

C. Expansion Anchors:
1. Protect threads from damage during anchor installation and prior to use.
2. Set anchors to Manufacturer's recommended torque, using a torque wrench. Following attainment of ten (10) percent of specified torque, one hundred (100) percent of specified torque shall be reached within 7 or fewer complete turns of nut. If specified torque is not achieved within required number of turns, remove and replace anchor, unless otherwise directed by Architect.

D. Screw Anchors:
1. Protect threads from damage during anchor installation and prior to use.
2. Set anchor flush, collared.
3. Do not exceed Manufacturer's maximum allowed torque when seating anchor.

3.08 NON-SHRINK GROUTING

A. Surface Preparation:
1. Prepare concrete surfaces in accordance with Manufacturer's written instructions:
2. Remove all loose materials.
3. Clean surface of any substance that could interfere with bond on material including dirt, paint, tar, asphalt, wax, oil, grease, latex compounds, form release agents, laitance, loose toppings, foreign substances and any other residues.
4. Saturate area to be grouted with water in accordance with Manufacturer's written instructions.

B. Mixing:
1. Mix grout in accordance with Manufacturer's written instructions.
2. Add mix water in amount in accordance with Manufacturer's written instructions to provide required placing consistency.
3. Do not add water in amount that will cause bleeding or segregation of mixed grout.
4. Do not add any sand, cement, admixtures, or fluidifiers to grout.

C. Placement:
1. Place grout in accordance with Manufacturer's written instruction including but not limited to the following:
    a. Proper curing is required.
    b. Use cold weather or hot weather grouting procedures in accordance with Manufacturer's written instructions, as temperature dictates:
        1) Do not use at temperatures that may cause premature freezing.
        2) Do not allow to freeze until 4000 psi (27.6 MPa) is attained.
    c. Employ cold weather or hot weather grouting practices as temperatures dictates.

2. Completely eliminate air pockets and provide full contact between grout and item being grouted. Do not exceed Manufacturer's recommended thickness.

D. Curing:
1. Cure grout in accordance with Manufacturer's written instructions or ACI curing practices.
2. Wet cure grout until forms are removed.
3. Seal grout surfaces after forms are removed as recommended by Manufacturer.

E. Keep grout surfaces wet after curing compound has dried for as long as recommended by Manufacture.

F. Protect placed grout from freezing until minimum strength of 4000 psi (27.58 MPa) is reached.

G. Protect placed grout from damage during construction.

3.09 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Quality Control is sole responsibility of Contractor.
1. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
a. Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

C. Provide free access to concrete operations at project site and cooperate with appointed firm.

D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

E. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.

F. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.

G. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

H. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

I. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.

J. Permeability Test: Test concrete with waterproofing admixture according to COE CRD-C 48.

K. Precast Concrete:
1. Testing Agency shall provide inspection including following:
a. Review all precast plant test reports.
b. Provide inspection of all precast during construction, transportation, and erection, verifying precast is undamaged, and installed in accordance with requirements of Contract Documents.
c. Provide inspection of precast concrete anchorages to other components of structure.

L. Expansion Anchors / Adhesive Anchors / Screw Anchors:
1. Certified Inspector from Testing Agency shall verify procedures used for installation of all concrete anchors and monitor their installation for compliance with Manufacturer's requirements.
2. Inspections:
a. Inspections shall include required verification and inspection of anchors as referenced in IBC Table 1704.4 and in accordance with most current version of ACI 318 or ACI 318M and applicable ASTM material standards that:

1) The correct rod/anchor is used; size and type.
2) The correct hole size is used and prepared per Manufacturer's instructions.
3) That climactic conditions, and concrete temperature, allow for the anchors' installation and use.
4) Proper hole cleaning equipment, per Manufacturer's instructions, is used.
5) Torque applied to anchors does not exceed Manufacturer's allowable limits.
   (a) Torque applied to anchors is per Manufacturer's instructions.

3.10 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect for each individual area.

3.11 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

B. Protect installed products from damage during construction.

END OF SECTION 03 3000

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SECTION 04 2000
UNIT MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete block.

B. Mortar and grout.

C. Reinforcement, anchors, inserts and anchorage.

D. Accessories.

1.02 REFERENCE STANDARDS

A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials; 2010 (Reapproved 2015).

B. ACI 355.4 - Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary; 2020.

C. ACI 548.12 - Specification for Bonding Hardened Concrete and Steel to Hardened Concrete with an Epoxy Adhesive; 2012.

D. ASCE 5 - Building Code Requirements and Specification for Masonry Structures; 2011.

E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

F. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.

H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

I. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts; 2021a.

J. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2022.

K. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement; 2022.

L. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2022.

M. ASTM C1019 - Standard Test Method for Sampling and Testing Grout for Masonry; 2019.

N. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

O. ASTM C331/C331M - Standard Specification for Lightweight Aggregates for Concrete Masonry Units; 2017.

P. ASTM C34 - Standard Specification for Structural Clay Loadbearing Wall Tile; 2017.

Q. ASTM C55 - Standard Specification for Concrete Building Brick; 2017.

R. ASTM C56 - Standard Specification for Structural Clay Nonloadbearing Tile; 2013 (Reapproved 2017).

S. ASTM C62 - Standard Specification for Building Brick (Solid Masonry Units Made From Clay or Shale); 2017.

T. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile; 2021.

U. ASTM C73 - Standard Specification for Calcium Silicate Brick (Sand-Lime Brick); 2017.

V. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units; 2022.

W. ASTM C126 - Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units; 2022.

X. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.

Y. ASTM C150/C150M - Standard Specification for Portland Cement; 2022.

Z. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2018.

AA. ASTM C212 - Standard Specification for Structural Clay Facing Tile; 2022.

BB. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); 2022.

CC. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

DD. ASTM C315 - Standard Specification for Clay Flue Liners and Chimney Pots; 2007 (Reapproved 2021).

EE. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2018.

FF. ASTM C476 - Standard Specification for Grout for Masonry; 2022.

GG. ASTM C530 - Standard Specification for Structural Clay Nonloadbearing Screen Tile; 2013 (Reapproved 2017).

HH. ASTM C652 - Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale); 2022.

II. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units; 2021.

JJ. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry; 2020.

KK. ASTM C1261 - Standard Specification for Firebox Brick for Residential Fireplaces; 2013, with Editorial Revision (2017).

LL. ASTM C1283 - Standard Practice for Installing Clay Flue Lining; 2015 (Reapproved 2021).

MM. ASTM C1405 - Standard Specification for Glazed Brick (Single Fired, Brick Units); 2020a.

NN. ASTM C1634 - Standard Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units; 2020.

OO. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

PP. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber; 2020.

QQ. ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications; 2018.

RR. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness; 2015 (Reapproved 2021).

SS. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.

TT. ASTM D2287 - Standard Classification System and Basis for Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds; 2019.

UU. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane; 2015, with Editorial Revision (2022).

VV. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover; 2008a (Reapproved 2019).

WW. ASTM E488/E488M - Standard Test Methods for Strength of Anchors in Concrete Elements; 2022.

XX. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

YY. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls; 2017.

ZZ. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls; 2005.

AAA. BIA Technical Notes No. 46 - Maintenance of Brick Masonry; 2017.

BBB. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements; 2015.

CCC. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements; 2015.

DDD. ICC-ES AC58 - Acceptance Criteria for Adhesive Anchors in Masonry Elements; 2015.

EEE. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, masonry accessories, and post-installed anchors.
   1. Source Quality Control Submittals:
      a. Manufacturer's certification that units meet compressive strength specified requirements.
   2. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.
   3. Provide current Manufacturer’s applicable ICC ESR Evaluation Reports and ICC ES Acceptance Criteria showing conformance for each item.
      a. Manufacturer's published installation instructions for each item.

C. Shop Drawings: Indicate pertinent dimensions, materials, anchorage, size and type of fasteners, and accessories for brickwork support system.
   1. Include calculations or selections from the manufacturer's prescriptive design tables that indicate compliance with the applicable building code and project conditions.

D. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

E. Test Reports: Concrete masonry manufacturer's test reports for units with integral water repellent admixture.

F. Closeout Submittals:
   1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
      a. Record Documentation:
         1) Testing and Inspection Reports:
            (a) Testing Agency Testing and Inspection Reports.

1.04 QUALITY ASSURANCE

A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.

B. Scheduling:
   1. Structural Masonry and Post Installed Drilled Anchors:
      a. Notify Testing Agency and Architect twenty-four hours minimum before placing masonry units, reinforcing, mortar and/or grout or installing post installed drilled anchors.
      b. Inspections shall be performed according to Manufacturer’s submitted ICC ES Evaluation Reports.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered in original, unopened packages with labels intact.

B. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

C. Storage and Handling Requirements:
   1. Aggregate:
      a. Store different aggregates separately.
      b. Store on high ground, or ideally, off ground to prevent contamination from dirt, organic materials and ground water, any of which may contribute to efflorescence and may be deleterious to mortar performance.
      c. Store under protective cover to avoid saturation and freezing in cold weather.
   2. Cementitious material:
      a. Store in such manner as to prevent deterioration or intrusion of foreign material or moisture.
      b. Do not use cementitious materials that have become contaminated.
      c. Protect from precipitation and groundwater.
         1) Store materials on elevated platforms, under cover, and in dry location.
         2) Do not use cementitious materials that have become damp or has become unsuitable for good construction.
   3. Masonry accessories:
      a. Store masonry accessories clear of ground, including metal items, to prevent corrosion and contamination by dirt and ground water which may contain soluble salts and other matter which may contribute to efflorescence and staining.
      b. Plastic and asphalt coated flashing material should not be stored in areas exposed to sunlight. During installation, flashing must be pliable so that no cracks occur at corners or bends.
      c. Protect from damage until installation.
   4. Masonry units:
      a. Store materials protected from exposure to harmful weather conditions as directed by manufacturer.
      b. Store material on planks clear of ground which may contain soluble salts and protect from damage, dirt, or disfigurement.
      c. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof membrane, securely tied. If units become wet, do not install until they are dry.
   5. Masonry Reinforcement:
      a. Protect reinforcement, ties, and metal accessories from permanent distortions, elements and store off ground.

D. Store materials protected from exposure to harmful weather conditions and as directed by manufacturer.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Design Criteria:
      a. Minimum Compressive Strength of (2000 psi 13.8 MPa).
   2. Materials:
      a. Meet requirements of ASTM C90, lightweight classification:
      b. 85 lbs per cu ft (1 362 kg per cu meter) minimum weight classification.
      c. Lightweight aggregates conforming to ASTM C331/C331M.
      d. Do not use re-crushed masonry units as aggregate.
      e. Outside Corners: Square-edged, except where bull nose is indicated on Contract Drawings.

f. Use special shapes for lintels, corners, jambs, sash, control joints, headers, bonding, etc, as required.
g. Uniform color and textures with unbroken edges. Smooth face, except where shown otherwise on Contract Drawings.

2.02 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C94/C94M, ASTM C150/C150M, Type I; color as required to produce approved color sample.
1. Not more than 0.60 percent alkali.

B. Hydrated Lime: ASTM C207, Type S.

C. Mortar Aggregate: ASTM C144.

D. Grout Aggregate: ASTM C144, ASTM C404 and ASTM C476

E. Admixtures:
1. Use no admixtures without Architect's written permission. Use of any admixture to meet cold weather requirements and admixtures that increase air entrainment are expressly forbidden under all circumstances.

F. Antifreeze Compounds:
1. No antifreeze liquids, salts or other substances shall be used in grout to lower freezing point.

G. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
1. Use only in combination with masonry units manufactured with integral water repellent admixture.
2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
3. Meet or exceed performance specified for water repellent admixture used in masonry units.

H. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
1. Color: Standard gray.

I. Provide grout that conforms to requirements of ASTM C476 and TMS 602/ACI 530.1/ASCE 6.

J. Water: Clean and potable, free of acids, alkalis, and organic materials.

2.03 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; galvanized

B. Cold-drawn steel conforming to ASTM A1064/A1064M.
1. Continuous Joint Reinforcing:
a. Conform to ASTM A1064/A1064M. Exterior wall reinforcing shall be galvanized to meet requirements of ASTM A153/A153M, Class B-2. Interior wall reinforcing shall be galvanized to meet requirements of ASTM A1064/A1064M, Class A.
b. Size: 2 inches less than nominal thickness of wall.
c. Rod Size:
1) Side rods: 9 gauge (1.48 inch) or 3/16 inch diameter.
2) Cross rods: 9 gauge or 3/16 inch diameter.
d. Cross rods that serve as metal ties in exterior cavity and other multi-wythe walls shall be drip crimped.
e. Corners and Tee Sections: Prefabricated of material and design similar to main reinforcement.
2. Finish: Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft² after fabrication).

C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.

D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss or ladder.
   2. Description:
      a. Prefabricated reinforcement for embedment in horizontal mortar joints if required by Contract Drawings.
   3. Acceptable Products. See Section 016200:
      a. No. 120 Truss-Mesh by Hohmann & Barnard.

E. Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
   1. Type: Truss.
   2. Where bed joints of wythes align, use joint reinforcing extending across wythes.
      a. Prefabricated joint reinforcement for embedment in horizontal mortar joints tying multiwythe masonry walls together.
   3. Where bed joints of wythes do not align, use:
      a. Acceptable Products. See Section 016200:
         1) No. 170-2X S.I.S. Truss Eye-Wire Adjustable Truss Eye-Wire w/2X-Hook &
   4. Seismiclip Interlock System by Hohmann & Barnard.
      a. No. 270-2X-SH Ladder adjustable reinforcement with 2X-Seismic Hook by Hohmann & Barnard.

F. Accessories:
   1. Rebar Positioners (Used with structural CMU construction):
      a. Design Criteria:
         1) Position rebar vertically in cell of CMU.
         2) Cold-drawn steel conforming to ASTM A1064/A1064M.
         3) Wire diameter: 9 gauge (1.48 inch or 3.7 mm).
         4) Finish: Hot-dipped galvanized as per ASTM A153/A153M (1.5 oz/ft (42.5 grams/305 mm).
      b. Class One Quality Standards:
         1) Single Curtain: No. RB Rebar Positioners by Hohmann & Barnard.
         2) Double Curtain: No. RB-Twin Rebar Positioners by Hohmann & Barnard.
      c. Type Two Acceptable Manufacturers. See Section 016200:
         1) Heckman Building Products Inc, Chicago, IL www.heckmannbuildingprods.com.
         2) Hohmann & Barnard, Hauppauge, NY www.h-b.com.
         3) Masonry Reinforcing Corporation of America, Charlotte, NC www.wirebond.com.
         4) Equal meeting Design Criteria as approved by Architect before installation. See Section 016200.

2.04 ANCHORS AND INSERTS

A. Manufactured Units:
   1. General:
      a. Use hot-dipped galvanized or stainless steel with matching nuts and washers in exterior and moist interior applications unless indicated otherwise on Drawings.
      b. Nut: Conform to requirements of ASTM A563, Grade A, Hex.
      c. Conform to requirements of ASTM F3125/F3125M for chemical, physical and mechanical requirements for quenched and tempered bolts manufactured from steel and alloy steel.

B. Embedded Anchor Bolts:
   1. Quality Standard. See Section 01 6000.
      a. Meet following design criteria requirements:
         1) Bent-bar Anchors: J and L-Bolts (threaded steel rods with hooks embedded into masonry):

(a) Non-headed type threaded 2 inches (50 mm) minimum conforming to material requirements of ASTM A36/A36M.
(b) Anchor hook to project 2 inch (50 mm) minimum including bolt diameter.
2) Headed Bolts:
(a) Headed type threaded 2 inch (50 mm) minimum conforming to requirements of ASTM A307, Grade A.

C. Post Installed Drilled Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
1. Design Criteria:
a. Design loads are determined from testing minimum of five (5) specimens in accordance with ASTM E488/E488M under stresses and conditions that represent intended use.
1) Allowable stress design values are limited to twenty (20) percent of average tested anchor bolt strength.
2) Using strength design provisions, nominal design strengths are limited to sixty-five (65) percent of average tested strength.
b. Effective embedment length: 2 inch (50 mm) minimum.
2. Adhesive Anchors:
a. Cartridge Injection Adhesive Anchors.
b. Products shall have current ICC ES Evaluation report conforming to current ICC ES Acceptance Criteria ICC-ES AC58 for masonry.
c. Rod diameter and embedment length as indicated on Contract Drawings.
d. Acceptable Products:
1) HIT-HY 270 by Hilti Fastening Systems, Tulsa, OK; www.us.hilti.com.
2) SET ET-3G by Simpson Strong-Tie Co., Pleasanton, CA www.strongtie.com.
3) Equal as approved by Architect before installation. See Section 01 6000.
3. Drilled-In Mechanical Anchors (Expansion Bolts):
a. Products shall have current ICC ES Evaluation report conforming to current ICC ES Acceptance Criteria ICC-ES AC01 for masonry.
b. Acceptable Products:
1) Kwik Bolt TZ2 by Hilti Fastening Systems, Tulsa, OK www.us.hilti.com.
2) Strong Bolt 2 by Simpson Strong-Tie Co., Pleasanton, CA www.strongtie.com.
3) Equal as approved by Architect before installation. See Section 01 6000.
4. Screw Anchors:
a. Provide anchors with length identification markings conforming to ICC-ES AC106 for masonry.
b. Acceptable Products:
1) Titen HD by Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
2) Hilti KH-EZ by Hilti Fastening Systems, Tulsa, OK, www.us.hilti.com
3) Equal as approved by Architect through shop drawing submittal before installation. See Section 01 6000.

2.05 ACCESSORIES

A. Cleaning Solution:
1. Acceptable Products:
a. 202 or 202V by Diedrich Technologies, Oak Creek, WI www.diedrichtechnologies.com.
b. Surekleen No. 600 or Vana-Trol by ProSoCo Inc, Kansas City, KS www.prosoco.com.
c. Equal as approved by Architect before use. See Section 01 6000.

2.06 MORTAR AND GROUT MIXING

A. Mortar for Unit Masonry: ASTM C270, using the Property Specification.
1. Masonry below grade and in contact with earth: Type M.
2. Exterior, loadbearing masonry: Type S

3. Exterior, non-loadbearing masonry: Type S
4. Interior, loadbearing masonry: Type S.
5. Interior, non-loadbearing masonry: Type O.

B. Grout for Unit Masonry: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
   1. Grout proportions shall be determined by one of the following methods:
      a. As per ASTM C476 Table 1: 'Grout proportions by Volume" for fine and coarse grout.
      b. Specified Compressive Strength: Proportions established by twenty-eight (28) day compressive strength tests in accordance with Test Method ASTM C1019 that obtain specified compressive strength:
      c. Grout shall be mixed to slump of 8 to 11 inches as determined by Test Method ASTM C143 and shall have minimum compressive strength of 2000 psi at 28 days.

C. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.

D. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Verification of Masonry Anchor and Insert Conditions:
   1. Post Installed Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):
      a. Base Material Strength:
         1) Unless otherwise specified, do not drill holes in masonry until mortar, or grout has achieved full design strength.
      b. Identify position of reinforcing steel and other embedded items before drilling holes for anchors.
      c. Exercise care in coring or drilling to avoid damaging existing reinforcing or embedded items.
      d. Take precautions as necessary to avoid damaging, electrical and telecommunications conduit, and gas lines.
      e. Notify Architect/Engineer if reinforcing steel or other embedded items are encountered during drilling.

E. Notify Architect of any unsatisfactory preparation before proceeding.
   1. Do not install masonry over unsuitable conditions.
   2. Commencement of Work by installer is considered acceptance of substrate.

3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
   1. Clean surfaces prior to installation.
   2. Prepare surface in accordance with Manufacturer's written instructions.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

C. Coordinate placement of reinforcement, anchors and accessories, flashings and weep holes and other moisture control products specified in other sections.

D. Prior to placing masonry:
   1. Clean reinforcement by removing mud, oil, or other materials that will adversely affect or reduce bond at time mortar or grout is placed.

2. Remove laitance, loose aggregate, and anything else that would prevent mortar from bonding to foundation.

E. Wetting Masonry Units:
1. Concrete masonry:
a. Do not wet concrete masonry units before laying. Wet cutting is permitted.

F. Reinforcement:
1. Place reinforcement and ties in grout spaces prior to grouting.

G. Provide temporary bracing during installation of masonry work:
1. Design, provide, and install bracing that will assure stability of masonry during construction.
2. Maintain bracing in place until building structure provides permanent support.

3.03 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

B. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

C. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

3.04 MASONRY COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches.
3. Mortar Joints: Concave.

3.05 PLACING MASONRY UNITS, REINFORCING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.

F. Interlock intersections and external corners, except for units laid in stack bond.

G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

I. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

J. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.

K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

L. Interface with Other Work:
1. Masonry Cutting:

a. Make cuts proper size to accommodate work of other trades.
b. Cut openings for electrical devices using cover plates no larger than can be covered by standard size plate.
c. Replace unit masonry in which larger than necessary openings are cut.
d. Do not patch openings with mortar or other material.

M. Mortar:
1. Use mortar within two (2) hours of initial mixing. Discard mortar that has begun to set. Set masonry units within one (1) minute of spreading mortar.
2. Do not allow mortar build-up in cavity between brick veneer and Concrete Masonry Units (CMU).

N. Laying Masonry Units:
1. Layout:
a. Running bond except where indicated otherwise.
2. Joints:
a. Tool concave. Fill completely except where indicated differently.
b. Do not tool until mortar has taken initial set.
c. Point holes in joints. Fill and tool properly.
3. Concrete Masonry Units:
a. Lay hollow masonry units dry. Do not lay masonry on frozen material.
b. Place hollow units so:
1) Face shells of bed joints are fully mortared.
2) Webs are fully mortared in all courses of piers, columns and pilasters and when necessary to confine grout or insulation.
3) Head joints are mortared, minimum distance from each face equal to face shell thickness of unit.
4) Vertical cells to be grouted are aligned and unobstructed openings for grout are provided in accordance with Contract Drawings.
c. Align cells or cavities to preserve unobstructed cavity for grouting:
1) Foamed Insulation:
(a) Provide unobstructed cavity for foamed-in-place insulation installed in cells.
(b) Install in ungrouted cells in exterior walls.
2) Do not allow excess mortar to block cells.
3) Full bedding required on both webs and face shell under first course. Other courses need only face shell bedding except where bedding is needed to control flow of grout.

O. Reinforcing:
1. Reinforcing shall be free of material that may destroy bond.
2. Continuous Joint Reinforcing:
a. Single-Wythe Unit Masonry:
1) Beginning approximately 8 inches (200 mm) from base of masonry, provide joint reinforcing 16 inches (400 mm) on center vertically, except 8 inches (200 mm) on center if drip crimped unless noted otherwise by Contract Drawings.
b. Multi-Wythe Unit Masonry
1) Maximum offset between brick and block coursing is 1-1/4 inch (32 mm) using ladder adjustable-wire reinforcement or ladder adjustable-wire reinforcement with seismic hook type reinforcing. If brick and block coursing is exactly lined up, ladder adjustable-wire reinforcing may be used. However, such reinforcing may not be bent to fit coursing that does not line up. Space joint reinforcing at 16 inches on center unless noted otherwise by Contract Drawings.
c. Lap splices and intersections minimum of 6 inches (150 mm).
d. Ensure that all ends of longitudinal wire of joint reinforcement at laps are embedded in mortar or grout.
3. Reinforcing Bars:

a. Fabrication:
   1) Fabricate and bend steel reinforcing bars according to 'ACI Detailing Manual' (2004 edition or latest available) and as detailed on Contract Drawings.
   2) Reinforcement:
      (a) Fabricate reinforcing bars in accordance with fabricating tolerances of ACI 117.
      (b) Bend bars cold and do not heat bars.
      (c) Do not bend Grade 40 bars in excess of 180 degrees. Minimum inside diameter of bend is five bar diameters.
      (d) Minimum inside bend diameter for other bars is as follows:
         (1) No. 2 through No. 8 (M #10 through M #25): 6 bar diameters.
         (2) No. 9 through No. 11 (M #29 through M #36): 8 bar diameters.
b. Provide standard hooks that conform to following:
   1) Standard 180-degree hook: 180-degree bend plus minimum extension of 4 bar diameters or 2-1/2 inch (64 mm), whichever is greater.
   2) Standard 90-degree hook: 90-degree bend plus minimum extension of 12 bar diameters.
   3) For stirrups and tie hooks for No. 5 (M #l6) bar and smaller: 90-degree or 135-degree bend plus minimum of 6 bar diameters or 2-1/2 inch (64 mm), whichever is greater.
c. Placing Reinforcement Bars:
   1) Place reinforcing and dowels before pouring grout.
   2) Place reinforcement in accordance with the sizes, types, and locations indicated on Contract Drawings and as specified.
   3) Do not place dissimilar metals in contact with each other.
   4) Dowel vertical reinforcing bars out of structure below with bars of same size and spacing e. Support reinforcement to prevent displacement caused by construction loads or by placement of grout or mortar, beyond allowable tolerances.
   5) Unless accepted by Architect, do not bend reinforcement after it is embedded in grout or mortar.
   6) Completely embed reinforcing bars in grout in accordance with ‘Grout Placement’ as specified in Installation requirements in Part 3 of Section 040501: ‘Common Masonry Requirements’.
   7) Dowel vertical reinforcing bars out of structure below with bars of same size and spacing.
   8) Maintain clear distance between reinforcing bars and interior of masonry unit or formed surface of at least 1/4 inch (6.4 mm) for fine grout and 1/2 inch (12.7 mm) for coarse grout, d. Place reinforcing bars maintaining the following minimum cover:
      (a) Masonry face exposed to earth or weather:
         (1) 2 inch (50.8 mm) for bars larger than No. 5 (M #16).
      (b) 1-1/2 inch (38.1 mm) for No. 5 (M #16) bars or smaller.
   9) Maintain minimum clear distance between parallel bars of the nominal bar size or 1 inch (25.4 mm), whichever is greater.
   10) In columns and pilasters, maintain minimum clear distance between vertical bars of one and one-half times nominal bar size or 1-1/2 inch (38.1 mm), whichever is greater.
   11) Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections. See Contract Drawings.
d. Splicing:
   1) Splice 48 bar diameters minimum, unless noted otherwise by Contract Drawings.

2) Noncontact lap splices: Position bars spliced by noncontact lap splice no farther apart transversely than one-fifth specified length of lap nor more than 8 inch (200 mm).

e. Rebar Positioners:
1) Before grouting, secure masonry reinforcing steel in place before grouting with rebar positioners at top of first course and bottom of top course minimum.
2) Install intermediary positioners for every 192 bar diameters maximum between positioners.
3) Locate intermediary positioners with approximately equidistant spacing in wall when number required has been determined.

f. Place horizontal bars in 8 inch (200 mm) deep bond beam units at top of wall and at 48 inches (1 200 mm) on center between unless noted otherwise by Contract Drawings. Continue bond beam units and reinforcement uninterrupted around corners and across wall intersections.

g. Place special vertical bars of same size as normal vertical reinforcement at corners and jambs of openings and recesses where bond beams are interrupted and at beam bearing locations not otherwise detailed.

h. Unless detailed otherwise, place special horizontal bars of same size as normal reinforcing above and below openings. Extend bars 24 inches (600 mm) minimum beyond opening.

P. Grouting:
1. General:
a. Provide grout that conforms to requirements as specified in Section 04 0516: ‘Masonry Grouting’.
b. Use fine grout for cavities 2 inches (50 mm) and smaller in smallest dimension. Use coarse grout for cavities greater than 2 inches (50 mm) in smallest dimension.
c. Grout hollow metal door frames installed in masonry walls solid.
d. Provide grout-leveling bed for support of wall plates.
e. Fully grout cells containing reinforcing bars. Place and consolidate grout fill without displacing reinforcing.

2. Production Methods: Grout shall be produced using one of following procedures:
a. Materials mixed at job site:
1) Individual cementitious materials and aggregates stored at job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
2) Individual dry ingredients transported to job site in suitable compartments shall be mixed with water at job site using continuous volumetric proportioning equipment to achieve desired consistency. Mix with auger of appropriate length to provide adequate mixing.

b. Mixed materials transported to job site:
1) Factory dry-blended cementitious materials and aggregates delivered to job site shall be mixed in mechanical mixer for minimum of five (5) minutes with sufficient water to achieve desired consistency.
2) Wet-mixed grout shall arrive at job site in ready-mixed condition. Slump shall be adjusted as necessary, and grout shall be re-mixed at mixing speed for at least one minutes before discharging to achieve desired consistency.

c. Grout may be hand mixed on small jobs with written approval of mixing procedure by Architect.

3. Placing time:
a. Place grout within 1-1/2 hours of introducing water in the mixture and prior to initial set:
1) Discard site-mixed grout that does not meet specified slump without adding water after initial mixing.
2) For ready-mixed grout:

(a) Addition of water is permitted at time of discharge to adjust slump.
(b) Discard ready-mixed grout that does not meet specified slump without adding water, other than water that was added at time of discharge.
(c) Time limitation is waived as long as ready-mixed grout meets specified slump.

4. Confinement:
   a. Confine grout to areas indicated on Contract Drawings. Use material to confine grout that permits bond between masonry units and mortar.
5. Grout Pour Height:
   a. Place grout in 48 inch (1 200 mm) maximum lifts.
6. Consolidation:
   a. Consolidate grout at time of placement in by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred
7. Grout Key:
   a. When grouting, form grout keys between grout pours. Form grout keys between grout lifts when first lift is permitted to set prior to placement of subsequent lift:
   b. Form grout key by terminating grout minimum of 1-1/2 inch (38 mm) below mortar joint.
   c. Do not form grout keys within beams.
   d. At beams or lintels laid with closed bottom units, terminate grout pour at bottom of beam or lintel without forming grout key.

Q. Embedded items and accessories:
1. Install embedded items and accessories as follows:
   a. Construct chases as masonry units are laid.
   b. Install pipes and conduits passing horizontally through masonry partitions.
   c. Place pipes and conduits passing horizontally through piers, pilasters, or columns.
   d. Place horizontal pipes and conduits in and parallel to plane of walls.
   e. Install and secure connectors, flashing, weep holes, weep vents, nailing blocks, and other accessories.
   f. Provide control joints and expansion joints as shown on Contract Drawings.
   g. Aluminum:
      1) Do not embed aluminum conduits, pipes, and accessories in masonry, grout, or mortar, unless they are effectively coated or isolated to prevent chemical reaction between aluminum and cement or electrolytic action between aluminum and steel.

3.06 ANCHORS AND INSERTS

A. Embedded Anchor Bolts:
1. Embed Headed and J Bolts larger than 1/4 inch (6.4 mm) diameter in grout that is placed in accordance with ‘Grout Placement’ as specified in Installation requirements in Part 3 of this specification. Anchor bolts of 1/4 inch (6.4 mm) diameter or less are permitted to be placed in grout.
2. For anchor bolts placed in top of grouted cells and bond beams, maintain clear distance between bolt and face of masonry unit of at least 1/4 inch (6.4 mm) when using fine grout and at least 1/2 inch (12.7 mm) when using coarse grout.
3. For anchor bolts placed through face shell of hollow masonry unit, drill hole that is tight-fitting to bolt or provide minimum clear distance:
4. For portion of bolt that is within grouted cell, maintain clear distance between bolt and face of masonry unit and between head or bent leg of bolt and formed surface of grout of at least 1/4 inch (6.4 mm) when using fine grout and at least 1/2 inch (12.7 mm) when using course grout.
5. Place anchor bolts with clear distance between parallel anchor bolts not less than nominal diameter of anchor bolt, nor less than 1 inch (25 mm).

B. Post Installed Drilled Anchors (Concrete Masonry Unit (CMS) and Hollow Brick Unit Masonry):

1. General:
   a. Drill holes with rotary impact hammer drills using carbide-tipped bits or core drills using diamond core bits.
   b. Unless otherwise shown on Contract Drawings, drill holes perpendicular to masonry surface.
   c. Where anchors are to be installed in cored holes, use core bits with matched tolerances specified by Manufacturer. Cores holes may only be used if acceptable to Manufacturer.
   d. Perform anchor installation in accordance with Manufacturer's published instructions.
2. Adhesive Anchors:
   a. Clean holes in accordance with Manufacturer's published instructions before installation of adhesive. Follow Manufacturer's instructions to ensure proper mixing of adhesive components.
   b. Inject adhesive into holes proceeding from bottom of hole and progressing toward surface so as to avoid introduction of air pockets into adhesive. Inject sufficient adhesive into hole to ensure that annular gap is filled to surface.
   c. Remove excess adhesive from surface.
   d. Shim anchors with suitable device to center anchor in hole. Do not disturb or load anchors before Manufacturer's specified cure time has elapsed.
   e. Observe Manufacturer's instructions with respect to installation temperatures for adhesive anchors. Base material temperatures must be maintained above minimum temperatures allowed by Manufacturer for full required epoxy cure time.
3. Drilled-in Mechanical Anchors (Expansion Bolts):
   a. Protect threads from damage during anchor installation.
   b. Set anchors to Manufacturer's recommended torque, using torque wrench. Following attainment of ten (10) percent of specified torque, one hundred (100) percent of specified torque shall be reached within 7 or fewer complete turns of nut. If specified torque is not achieved within required number of turns, remove and replace anchor, unless otherwise directed by Architect.
4. Screw Anchors:
   a. Protect threads from damage during anchor installation.
   b. Set anchors to Manufacturer's recommended torque, using torque wrench.

3.07 TOLERANCES

A. Install masonry within the site tolerances found in TMS 402/602.

B. Maximum Variation from Alignment of Columns: 1/4 inch.

C. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

D. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

E. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

F. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

G. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/4 inch, plus 3/8 inch.

H. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

I. Maintain 3/8 inch mortar joints throughout.

J. Grout space or cavity width, except for masonry walls passing framed construction: minus 1/4 inch (6.4 mm), plus 3/8 inch (9.5 mm).

K. Reinforcing Bars:
   1. Place horizontal and vertical reinforcing bars in walls and flexural elements within tolerance of +- 1/2 inches when:
   2. Distance from centerline of reinforcing bars to opposite face of masonry is equal to 8 inches or less.

a. +- 1 inch for centerline of reinforcing bars to opposite face of masonry is equal to 24 inches or less but greater than 8 inches.
b. +- 1-1/4 inch for centerline of reinforcing bars to opposite face of masonry is greater than 24 inches.

3. Place vertical reinforcing bars within:
   a. 2 inch of required location along length of wall when wall segment length exceeds 24 inches.
   b. 1 inch of required location along length of wall when wall segment length does not exceed 24 inches.
4. If it is necessary to move bars more than one (1) bar diameter, or distance exceeding tolerance stated above, to avoid interference with other reinforcing steel, conduits, or embedded items, notify Architect for acceptance of resulting arrangement of bars.
5. Foundation dowels that interfere with unit webs are permitted to be bent to maximum of 1 inch horizontally for every 6 inch of vertical height.

3.08 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 4000 - Quality Requirements.

B. Civil and structural field tests, laboratory testing, and inspections are provided by Owner's independent Testing Agency as specified in 01 4000 - Quality Requirements:
   1. Quality Control is sole responsibility of Contractor.
      a. Owner's employment of an independent Testing Agency does not relieve Contractor of Contractor's obligation to perform testing and inspection as part of his Quality Control:
         1) Testing and inspections, if performed by Contractor, will be responsibility of Contractor to be performed by an independent entity.

C. Unit Masonry:
   1. Masonry (Masonry Prisms, Masonry Units, Reinforcement, Mortar and Grout):
      a. Testing and Inspections shall conform to IBC Section 17 'Special Inspections And Tests' and in accordance with Chapter 3 'Quality And Construction' of TMS 402/ACI 530.1/ASCE 5 (Building Code Requirements for Masonry Structures) and TMS 602/ACI 530.1/ASCE 6 (Specification for Masonry Structures):
         1) Quality assurance program shall comply with requirements of Chapter 3, for Level A 'Quality Assurance' for Risk Category I, II, or III structures or Level B 'Quality Assurance' for Risk Category IV structures and as defined in ASCE 7 or latest approved adopted building code. See Structural Design Criteria as shown on Contract Documents.
      b. Concrete Masonry Unit Tests: Test each variety of concrete unit masonry in accordance with ASTM C140/C140M for compliance with requirements of this specification.
      c. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

D. Post Installed Drilled Anchor and Insert Tests:
   1. Certified Inspector from Testing Agency shall verify procedures used for installation of all post installed anchors and monitor their installation for compliance with manufacturer's requirements.
   2. Testing: Ten (10) percent of each type and size of drilled-in anchor shall be proof loaded by Testing Agency's testing laboratory or as directed by Architect. Adhesive anchors will not be torque tested unless otherwise directed by Architect. If more than ten (10) percent of tested anchors fail to achieve specified torque or proof load within limits defined on Drawings, all anchors of same diameter and type as failed anchors shall be tested at Contractor's expense, unless otherwise instructed by Architect.
      a. Torque will be applied with calibrated torque wrench.

b. Proof loads will be applied with calibrated hydraulic ram. Displacement of adhesive anchors at proof load shall not exceed D/10, where D is nominal anchor diameter.

3. Non-Conforming Work:
   a. Remove and replace defective material at Architect's direction and at no additional cost to Owner.
   b. Remove and replace misplaced or malfunctioning anchors.
   c. Fill empty anchor holes and patch failed anchor locations with high-strength, non-shrink, nonmetallic grout acceptable to Architect.
   d. Anchors that fail to meet proof load or installation torque requirements will be regarded as malfunctioning.
   e. Repair damage to adjacent materials caused by product installation.

E. Inspection, sampling and testing of masonry materials in enclosure walls is not required.

3.09 CLEANING

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

E. Waste Management:
   1. Unit Masonry:
      a. Clean up masonry debris and remove from site.

3.10 PROTECTION

A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

B. Cold Weather Requirements:
   1. In cold weather, all materials and walls should be properly protected against freezing including storing of materials, preparation of mortar, heating of masonry units, laying precautions, and protection of Work.
   2. Remove all masonry deemed frozen or damaged.

END OF SECTION 04 2000

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shop fabricated steel items.

B. Miscellaneous steel.
   1. Lintels.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 04 2000 - Unit Masonry: Placement of metal fabrications in masonry.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

C. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.

D. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.

G. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.

H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.

I. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).

J. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer 2004.

K. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's data sheets on each ladder safety system product to be used, including installation instructions.

C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
      a. Include the following, as applicable:
         1) Design criteria.
         2) Engineering analysis depicting stresses and deflections.
         3) Member sizes and gauges.
         4) Details of connections.

5) Support reactions.
6) Bracing requirements.

1.05 QUALITY ASSURANCE

A. Welders shall be certified 30 days minimum before beginning work on project. If there is doubt as to proficiency of welder, Architect may require welder to take another test, at no expense to Owner. Certification shall be by Pittsburgh Laboratories or other authority approved by Architect.

B. Maintain welders' certifications on job-site.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
   1. Anchor Rods For Steeple Base Connections: Conform to requirements of ASTM A36/A36M.
   2. Anchor bolts: Conform to requirements of ASTM A307, Grade A.

F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

A. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

B. Field weld components as indicated on drawings.

C. Perform field welding in accordance with AWS D1.1/D1.1M.

D. Minimum weld sizes, unless detailed otherwise:
   1. Weld pipe columns to base plates and top plates with 1/4 inch fillet weld all around.
   2. Weld glu-lam connection side plates to base plates with 1/4 inch fillet weld all along outside edges.
   3. Weld stiffeners to pipe columns with 1/4 inch fillet weld all around.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed , except surfaces to be in contact with concrete.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.05 ADJUSTING

A. Immediately after installation, touch up primed surfaces damaged by installation procedures to provide appropriate surface for finish painting.

END OF SECTION

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SECTION 06 0573
WOOD TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preservative treatment for wood materials.

1.02 DEFINITIONS

A. Preservative-Treated Wood: Wood exposed to high levels of moisture or heat susceptible to decay by fungus and other organisms, and to insect attack. The damage caused by decay or insects can jeopardize the performance of the wood members so as to reduce the performance below that required. Preservative treatment requires pressure-treatment process to achieve depth of penetration of preservative into wood to verify that the wood will be resistant to decay and insects over time.

B. Flame Spread: The propagation of flame over a surface.

C. Flame Spread Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.

D. Smoke-Developed Index: The numerical value assigned to a material tested in accordance with ASTM E84 or UL 723.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

B. AWPA U1 - Use Category System: User Specification for Treated Wood 2022.

C. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials 2006.

D. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Keep materials dry during transit with labels intact and store in dry location at all times.

PART 2 PRODUCTS

2.01 FACTORY APPLIED WOOD TREATMENT

A. Factory Applied Preservative Wood Treatment:
   1. Acceptable Manufacturers:
      a. Arch Wood Protection Inc, Atlanta, GA www.wolmanizedwood.com.
      b. Hoover Treated Wood Products, Thomson, GA www.frtw.com.
      c. Osmose Inc, Griffin, GA www.osmose.com.
      d. U S Borax Inc, Valencia, CA www.borax.com/wood.
      e. Viance LLC, Charlotte, NC www.treatedwood.com.
      f. Equal as approved by Architect before bidding. See Section 016000.
   2. Framing lumber grade and species shall be as specified in Section 061100 for particular use.
   3. Interior Wood In Contact With Concrete or Masonry:
      a. Preservatives:
         1) Disodium octoborate tetrahydrate (DOT / SBX) meeting requirements of AWPA U1 and with retention of 0.25 lbs per cu ft.
         2) Zinc borate meeting requirements of AWPA U1 and with retention of 0.17 lbs per cu ft.

3) CCA-C (47.5 percent chromium trioxide, 18.5 percent copper oxide and 34 percent arsenic pentoxide) by Koppers Performance Chemicals, Griffin, Georgia, http://www.koppersperformancechemicals.com/ (0.25 lb/cu ft minimum retention).
4) DURA-GUARD by Hoover Treated Wood Products, Thomson, GA www.frtw.com (.40 lb/cu ft minimum retention).

b. Lumber: Treat in accordance with AWPA U1.
c. Millwork: Treat in accordance with AWPA N1 and dry after treatment.

4. Exterior Wood Continuously Exposed To Weather:
a. Preservatives: Waterborne preservatives meeting requirements of AWPA U1 with retention levels as required by AWPA U1 for specific application.
b. Lumber: Treat in accordance with AWPA U1.

PART 3 EXECUTION

3.01 PREPARATION

3.02 INSTALLATION - GENERAL

A. Provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FIELD-APPLIED WOOD TREATMENT

A. Comply with manufacturer's written mixing and application instructions.

3.04 APPLICATION

A. Treated wood shall not be installed in areas where it is exposed to precipitation, direct wetting, or regular condensation.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Nonstructural dimension lumber framing.

C. Rough opening framing for roof openings.

D. Sheathing.

E. Roof-mounted curbs.

F. Roofing nailers.

G. Preservative treated wood materials.

H. Miscellaneous framing and sheathing.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 04 2000 – Unit Masonry: Setting anchors in masonry and bond beams.

C. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

1.03 REFERENCE STANDARDS

A. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).

B. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples 2021.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

E. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).

F. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.

H. PS 1 - Structural Plywood 2009 (Revised 2019).

I. PS 2 - Performance Standard for Wood Structural Panels 2018.

J. PS 20 - American Softwood Lumber Standard 2021.

K. SPIB (GR) - Grading Rules 2014.

L. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.

M. WWPA G-5 - Western Lumber Grading Rules 2021.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

C. Manufacturer's literature on framing anchors and powder-actuated fasteners.

1. Submit diameter and lengths of fasteners proposed for use on Project. If length of diameter of proposed fasteners differ from specified fasteners, also include technical and engineering data for proposed fasteners including, but not limited to:
   a. Adjusted fastener spacing where using proposed fasteners and,
   b. Adjusted number of fasteners necessary to provide connection capacity equivalent to specified fasteners.
2. Submit on powder-actuated fasteners other than those specified in Contract Documents, show design criteria equivalents at each location.
3. Show type, quantity and installation location of framing anchors. Where necessary, reference Drawing details, etc, for installation locations.

D. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:
1. Protect lumber and sheathing and keep under cover in transit and at job site.
2. Do not deliver material unduly long before it is required.

B. Storage And Handling Requirements:
1. Store lumber and sheathing on level racks and keep free of ground to avoid warping.
2. Stack to insure proper ventilation and drainage.

1.06 QUALITY ASSURANCE

A. Pre-Installation Conference:
1. Participate in MANDATORY pre-installation conference.
   a. Schedule pre-installation conference immediately before beginning framing work.
   b. In addition to agenda items specified in Section 01 3100, review following:
      1) Equipment and gypsum board blocking in wood framed walls.
      2) Rough opening.
      3) Shear walls and struts.
      4) Nails and nailing requirements.
      5) Connections.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
1. Species: Douglas Fir-Larch, unless otherwise indicated.
2. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
3. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
4. Design Criteria:
   a. Meet requirements of PS 20 and National Grading Rules for softwood dimension lumber.
   b. Bear grade stamp of WWPA, SPIB, or other association recognized by American Lumber Standards Committee identifying species of lumber by grade mark or by Certificate of Inspection.
   c. Lumber 2 inches (50 mm) or less in nominal thickness shall not exceed 19 percent in moisture content at time of fabrication and installation and be stamped 'S-DRY', 'K-D', or 'MC15'.
   d. Preservative Treated Plates / Sills:

1) 2x4 (38 mm by 64 mm): Standard and better Douglas Fir, Southern Pine, or HemFir, or StrandGuard by iLevel by Weyerhaeuser Boise, ID www.ilevel.com. (LSL 1.3 E) or as indicated on Contract Drawings.
2) 2x6 (38 mm by 140 mm) And Wider: No. 2 or MSR 1650f - 1.5e Douglas Fir, Southern Pine, HemFir, or StrandGuard by iLevel by Weyerhaeuser, Boise, ID www.ilevel.com. (LSL 1.3 E) or as indicated on Contract Drawings.

5. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

B. Posts, Beams, And Timbers 5 Inches by 5 Inches (125 mm by 125 mm) And Larger:
1. Design Criteria:
a. No. 1 or better Douglas Fir or Southern Pine unless noted otherwise by Contract Drawings.

C. Lumber Ledgers:
1. Design Criteria:
a. No. 1 Douglas Fir-Larch, or Southern Pine unless noted otherwise by Contract Drawings.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Stud Framing:
1. Species: Any allowed under referenced grading rules, or as noted by contract drawings.
2. Grade: No. 2, or as noted by Contract Drawings.

D. Joist, Rafter, and Small Beam Framing:
1. Machine stress-rated (MSR) as follows:
a. Fb-single (minimum extreme fiber stress in bending): 1350 psi, or as noted by Contract Drawings.
b. E (minimum modulus of elasticity): 1,300,000 psi, or as noted by contract drawings.
2. Species and Grades: As indicated on drawings for various locations.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS (WOOD SHEATHING)

A. See Contract Drawings for required thicknesses, span ratings and attachment requirements.

B. Sheathing: Meet requirements of PS 1, PS 2, or PRP-133 (TECO). Except where plywood is specifically indicated on Contract Drawings, oriented strand board (OSB) is acceptable.

C. Sheathing shall bear grade stamp from American Plywood Association (APA) or equal grading organization.

D. Sheathing shall not exceed 18 percent moisture content when fabricated or more than 19 percent when installed in Project.

E. Sheathing used for same purpose shall be of same thickness. In all cases, thickness specified is minimum required regardless of span rating.

F. Minimum span ratings for given thicknesses shall be as follows:
1. Thickness = Span Rating
a. 3/8 inch = 24 / 0
b. 7/16 inch nominal = 24 / 16
c. 15/32 inch actual = 32 / 16
d. 1/2 inch nominal = 32 / 16
e. 19/32 inch actual = 40 / 20
f. 5/8 inch nominal = 40 / 20

g. 23/32 inch actual = 48 / 24

2.04 ACCESSORIES

A. Fasteners and Anchors:
   1. General:
      a. Fasteners for preservative treated and fire-retardant-treated wood shall be of hot dipped zinc-coated galvanized steel, stainless steel, silicon bronzed, or copper. Coating weights for zinc-coated fasteners shall be in accordance with ASTM A153/A153M.
   2. Blocking:
      a. Sound lumber without splits, warps, wane, loose knots, or knots larger than 1/2 inch.
      b. Utility or better
   3. Nails:
      a. Meet requirements of ASTM F1667.
      b. Unless noted otherwise, nails listed on Drawings or in Specifications shall be common nail diameter, except 16d nails, which shall be box diameter.
   4. SDS Screws:
      a. Category Four Approved Products. See Section 01 6200 for definitions of categories.
      b. SDS Screws by Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
   5. Powder-Actuated Fasteners:
      a. Type One Quality Standard: Hilti X-DNI 62P8.
      b. Manufacturers:
         1) Hilti, Tulsa, OK www.us.hilti.com.
         2) Redhead Division of ITW, Wood Dale, IL www.itw-redhead.com and Markham, ON www.itwconstruction.ca.
   6. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   7. Framing Anchors:
      a. Framing anchors and associated fasteners in contact with preservative hot dipped zinc coated galvanized steel or stainless steel. Do not use stainless steel items with galvanized items.
      b. Acceptable Products:
         1) KC Metals Inc, San Jose, CA www.kcmetals.com.
         2) Simpson Strong Tie Co, Dublin, CA www.strongtie.com.
         3) United Steel Products Co Inc (USP), Montgomery, MN www.uspconnectors.com.
         4) Equals as approved by Architect through shop drawing submittal before installation.

B. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.
   1. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

C. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

D. Termite-Resistant Sill Plate Barrier: Self-adhesive, film-backed barrier with release sheet; adheres to concrete substrates and blocks termite access.
   1. Thickness: 68 mil, 0.068 inch.
   2. Termite Resistance: 100 percent when tested in accordance with ICC-ES AC380.

E. Subfloor Adhesives: Gap-filling construction adhesive for bonding wood structural panels to wood-based floor system framing; complying with ASTM D3498.

F. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.
   1. Manufacturers:

a. Meet requirements of ‘APA-The Engineered Wood Association’ Specification AFG-01 or ASTM D3498.
b. Use phenol-resorcinol type for use on pressure treated wood products.

PART 3 EXECUTION

3.01 PREPARATION

A. Use preservative treated wood for wood members in contact with concrete or masonry, including wall, sill and ledger plates, door and window subframes and bucks, etc.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 FRAMING INSTALLATION

A. Roof and Ceiling Framing:
1. Place with crown side up.
2. Install structural blocking and bridging as necessary and as described in Contract Drawings.
3. Special Requirements:
a. Roof and Ceiling Joists: Lap joints 4 inches minimum and secure with code approved framing anchors.
b. Roof Rafters and Outlookers:
1) Cut level at wall plate and provide at least 2-1/2 inches bearing where applicable. Spike securely to plate with three 10d nails.
2) Attach to trusses or other end supports with framing anchors described in Contract Drawings.
3) Provide for bracing at bearing partitions.

B. Firestops:
1. Horizontal or vertical concealed spaces in walls, light coves, soffits, drop ceilings, and other features over 10 feet in length or height, and at stairs, ceiling levels, floor levels, and other junctures of horizontal to vertical concealed spaces.
2. Within concealed spaces of exterior wall finishes and exterior architectural elements, such as trims, cornices or projections, at maximum intervals of 20 feet, length or height.

C. Sill Plates:
1. Shear Walls and Bearing Walls (structural walls):
a. Provide specified anchor 12 inches maximum and 4 inches minimum from each end of each plate.
b. Fasten with anchor bolts embedded in concrete or with post-installed anchors as noted in Contract Drawings.
2. Non-Structural Walls: Fasten with powder actuated fasteners.
3. In addition to requirements of paragraphs '1' and '2' above, set sill plates of interior walls measuring less than 36 inches in length in solid bed of specified construction adhesive, except where sill sealer is used.
4. Install specified seal sealer under sill plates of exterior walls and of acoustically insulated interior walls.

D. Posts And Columns:

1. Unless shown otherwise, nail members of multiple member columns together with 16d at 6 inches on center from each side.

E. Beams And Girders:
   1. Built-Up Members:
      a. Stagger individual members of multiple span beams and girders so, over any one support, no more than half the members will have a joint. In all cases, however, joints shall occur over supports.
      b. Unless shown otherwise on Contract Drawings, nail two-ply built-up members with 10d nails 12 inches on center top and bottom, staggered on opposite sides. Nail three-ply built-up ,members with 16d nails at 12 inches on center, top and bottom, staggered, on opposite sides. Set with crown edge up with full bearing at ends and intermediate supports.
   2. Pre-Fabricated Members:
      a. Solid glue-lam, LVL, LSL or PSL members may be used in place of built-up 2x framing members. Size shall be same as built-up member.
      b. Solid LVL or PSL members may be used in place of built-up LVL members. Size shall be same as sum of built-up members.
   3. Wood shims are not acceptable under ends.
   4. Do not notch framing members unless specifically shown in Drawing detail.

F. Nailing:
   1. Use nails and nail spacings required by Contract Drawings and:
      a. Top plates: Spiked together, 16d, 16 inches on center.
      b. Top plates: Laps, lap members 48 inches minimum and nail with 16d nails 4 inches on center
      c. Top plates: Intersections, three 16d
      d. Backing and blocking: Three 8d, each end.
      e. Corner studs and angles: 16d, 16 inches on center.

G. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

H. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

I. Install structural members full length without splices unless otherwise specifically detailed.

J. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes, AWC (WFCM) Wood Frame Construction Manual.

K. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

L. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

M. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

N. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.04 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fire blocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

3.05 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at each roof opening except where prefabricated curbs are specified and where specifically indicated otherwise; form corners by alternating lapping side members.

3.06 INSTALLATION OF CONSTRUCTION PANELS (WOOD SHEATHING)

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
   1. At long edges use sheathing clips ("H" clips) where joints occur between roof framing members.
   2. At long edges provide solid edge blocking where joints occur between roof framing members where roof is blocked. Refer to Contract Drawings.
   3. Nail panels to framing; staples are not permitted.
   4. Placing:
      a. Lay face grain at right angles to supports. Provide blocking for support if framing turns at roof overhang.
      b. Provide 1/8 inch (3 mm) space between sheets at end and side joints.
      c. Stagger panel end joints.
      d. Sheathing shall be continuous of two spans minimum.
   5. Edge Bearing and Blocking:
      a. As indicated on Contract Drawings.
   6. Nail Spacing:
      a. As indicated on Contract Drawings.
      b. Place nails at least 3/8 inch (9.5 mm) in from edge.
   7. Thickness:
      a. As indicated on Contract Drawings.
   8. Do not install any piece of roof sheathing with shortest dimension of less than 24 inches (600 mm) unless support is provided under all edges.

B. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples.
   1. Use plywood or other acceptable structural panels at building corners, for not less than 96 inches, measured horizontally.
   2. Provide inlet diagonal bracing at corners.
   3. Place water-resistive barrier horizontally over wall sheathing, weather lapping edges and ends.
   4. Spacing:
      a. Provide 1/8 inch (3 mm) space between sheets at end and edge joints.
   5. Edge Bearing And Blocking:
      a. Panel edges shall bear on framing members and butt along their center lines.
      b. Back block panel edges, which do not bear on framing members, with 2 inch nominal (45 mm) framing.
   6. Nail Spacing:
      a. As indicated on Contract Drawings.
      b. Place nails not less than 3/8 inch (9.5 mm) in from edge.
   7. Thickness:
      a. As indicated on Contract Drawings.

3.07 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

C. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.08 FIELD QUALITY CONTROL

A. Field Inspections:
   1. Sheathing:
      a. General:
         1) Owner is responsible for Quality Assurance. Quality assurance performed by Owner will be used to validate Quality Control performed by Contractor.
         2) Quality Control is sole responsibility of Contractor as specified in Section 01 4523 ‘Testing And Inspection Services’.
      b. For walls and roof areas where nail spacing is 4 inches and less on center, Inspector shall verify wood panel sheathing, grade, thickness and nominal size of framing members, adjoining panel edges, nail size and spacing, bolting and other fastening of other components.

END OF SECTION

SECTION 07 2100
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board, batt, and blown insulation where disturbed by other work.

1.02 REFERENCE STANDARDS

A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.

C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2022a.

D. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation 2019.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

F. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C 2022.

1.03 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.04 QUALITY ASSURANCE

A. Pre-Installation Conferences:
   1. Participate in pre-installation conference as specified in Section 01 3100:
      a. Schedule pre-installation conference prior to commencement of installing insulation with Installer and Manufacturer’s Representative if available.
      b. In addition to agenda items specified in Section 01 3100, review following:
         1) Review installation procedures.
         2) Review coordination of work with related and adjacent work.
         3) Review special details and flashing.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Thermal Insulation Manufacturers:
   1. Certainteed Corp, Valley Forge, PA www.certainteed.com.
   2. FiberTEK, Salt Lake City, UT www.fibertekinsulation.com.
   3. Guardian Fiberglass, Greer, SC www.guardianbp.com.
   4. Johns Manville, Denver, CO www.jm.com.
   5. Knauf Fiber Glass, Shelbyville, IN www.knaufusa.com.
   6. Owens-Corning Fiberglass Corporation, Toledo, OH www.owens-corning.com.
   7. Thermafiber, Wabash, IL www.thermafiber.com.

2.02 FOAM BOARD INSULATION MATERIALS

A. Type 2 Insulation:
   1. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
      a. Type and Compressive Resistance: Type X, 15 psi (104 kPa), minimum.
      b. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.

c. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

B. Type 1 & Type 3 Insulation:
1. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
a. Classifications:
1) Type I: Faced with aluminum foil on both major surfaces of the core foam.
(a) Class 2 - Glass fiber reinforced or non-reinforced core foam.
b. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
c. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
d. Board Edges: Square.
e. Products:
1) (Type 3 Insulation) Dow Chemical Company; THERMAX
(ci): www.dowbuildingsolutions.com/#sle.
(a) Provide Weathermate flashing tape at all joints by Dow Chemical.
2) (Type 3 Insulation) Dow Chemical Company THERMAX Heavy Duty: www.dowbuildingsolutions.com/#sle.

2.03 MINERAL FIBER BLANKET INSULATION MATERIALS

A. Order insulation by 'R' value rather than 'U' value, rating, or thickness, either 16 or 24 inches wide according to framing spacing.

B. Flexible Glass Fiber Blanket Thermal Insulation: Preformed insulation, complying with ASTM C665; friction fit.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 50 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
4. Thermal Resistance: R-value in accordance with the following:
a. Acoustically Insulated Ceilings:
1) Enclosed Spaces: Fill framed cavity with batt of appropriate thickness.
2) Unenclosed Spaces: R-19.
3) Unenclosed Spaces above Offices and Restrooms: R-30.
b. Thermally Insulated Ceilings / Roof:
1) R-38C Cathedral / High Density: At 2x12 (50x300 mm) Overbuild Framing.
2) R-38 Standard: All Other. (R-49 in Climate Zones 6, 7, and 8).
c. Wood Wall Stud Framing:
1) (R-11) 3-1/2 inches deep
2) (R-19) 5-1/2 inches deep
3) (R-25) 7-1/4 inches deep
5. Kraft faced meeting requirements of ASTM C665, Type II, Class C.
6. Foil faced meeting requirements of ASTM C665, Type III.
a. Class A: Exposed insulation.
b. Class B: Enclosed insulation.
7. Unfaced Insulation: Meet requirements of ASTM C665, Type I.
8. Support at trussed rafters:
a. Provide support at trussed rafters where insulation is not enclosed by structure or drywall.
b. Provide stings/wires which run perpendicular to framing and attach at each trussed rafter and to framing at 32 inches O.C. minimum and where batt ends adjoin each other.

c. Class Two Quality Standard: Simpson Strong Tie IS Insulation Supports with 14 gauge carbon steel, spring wire and mitered tips for 16 inch O.C. and 24 inch O.C. spacing.

2.04 BLOWN INSULATION

A. Blown Insulation: Fiber glass. Comply with requirements of ASTM C764, Type I or II, non-combustible when tested in accordance with ASTM E136.

B. 'R' Factor Required:
1. Order insulation by 'R' factor rather than 'U' factor, rating, or thickness.
a. Unenclosed Spaces: R38 minimum.

2.05 ACCESSORIES

A. Sheet Vapor Retarder: See Section 07 2600.

B. Attic Baffles:
1. Design Criteria:
a. Baffle can be used with spray foam, loose-fill, fiberglass, or other insulation materials.
2. Acceptable Manufacturers:
a. SB24 SmartBaffle by DCI Products, Inc., Clifton Heights, PA www.dciproducts.com.
b. Equal as approved by Architect before bidding. See Section 01 6000.

C. Spindle-Type Anchors:
1. Description:
a. Spindle welded to plate and including self-locking washer.
b. Perforated, galvanized carbon-steel plate 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square plate with copper-coated, low carbon steel, fully annealed, 0.105 inch (2.67 mm) diameter spindle, length to suit depth of insulation.
2. Acceptable Products:
a. Series T TACTOO Insul-hangers, RC150 or SC150 washers, and TACTOO Adhesive by AGM Industries, Brockton, MA www.agmind.com.
b. Stic-Klip Type N Fasteners and Stic-Klip Type S Adhesive by Eckel Industries of Canada Ltd, Morrisburg, ON www.eckel.ca.
c. Spindle Anchor, Dome-cap, R-150, or S-150 washer, Clutch-clip, and Tuff Bond Hanger Adhesive by GEMCO, Danville, IL www.gemcoinsulation.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verification Of Conditions:
1. Inspection:
a. Examine substrate and verify framing is suitable for installation of insulation:
b. Verify that mechanical and electrical services have been installed and tested.
c. Notify Architect of unsuitable conditions in writing.
d. Do not install insulation over unsuitable conditions:
1) Commencement of Work by installer is considered acceptance of substrate.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Remove ties and concrete protrusions that would keep insulation from fully contacting foundation wall face.

B. Install against interior side of perimeter foundation walls extending downward from top of slab 48 inches or to top of footing, whichever is less. Install using 3/8 inch beads of adhesive at 12 inches on center vertically and at each vertical and horizontal joint to completely seal insulation.

C. Install horizontally for 48 inches under building slab continuously around building perimeter and between slab and foundation wall for full depth of slab.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

A. Type 3 Insulation:
   1. Attachment to CMU wall.
      a. Attach insulation board to interior face of CMU wall as per manufacturer's installation instructions to provide continuous insulation over entire surface at locations shown on Construction Documents on Z furring with mechanical fasteners and closure strips.
   2. Following Manufacturer Installation Instructions including the following:
      a. Butt adjoining boards tightly together with all seams vertical.
      b. Tape seams with Manufacturer's white foil tape to cover joints and seams between boards of insulation. Match tape color to board color.
      c. Notch around wall members and other obstructions as closely as possible and seal with sealant.

B. Rigid thermal insulation board is not a structural panel and may not be used as nailing base for other building products.

3.04 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. If two layers of insulation are used to attain required 'R' value, only layer towards interior of building shall have facing.

C. Provide minimum clearance around recessed lighting fixtures as approved by local code.

D. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.

E. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

F. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

G. Install with factory-applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

H. Staple or nail facing flanges in place at maximum 6 inches on center.

I. Retain insulation batts in place with spindle fasteners at 12 inches on center.

J. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

K. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over face of member.

L. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member

M. Tape seal tears or cuts in vapor retarder.

N. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

O. Coordinate work of this section with requirements for vapor retarder, see Section 07 2600.

P. Coordinate work of this section with construction of air barrier seal, see Section 07 2700.

Q. Where insulation is not enclosed by structure or drywall, support in place with wire or other suitable material as approved by Architect before bid.

R. Attic Baffles:
   1. Install in accordance with manufacturer's instructions.
   2. Install baffles between trusses or rafters and underside of roof sheathing as shown on Contract Drawings.
   3. Install baffles between trusses and rafters at ventilation spaces to prevent insulation from blocking airflow from soffit.
   4. Install baffles to prevent insulation from blocking ventilation airflow from soffit.

S. Surface-Applied, Exposed on Masonry Walls:

1. Install adhesively applied spindle-type anchors at 12 inches (305 mm) each way.
2. After adhesive has dried, install insulation using foil-faced insulation only. Do not compress insulation below specified thickness and secure with specified washers.
3. Apply capped washers to tips of spindles.

3.05 BLOWN INSULATION INSTALLATION

A. General:
   1. Install in accordance with manufacturer's instructions.
   2. Install in insulation in sufficient depth to provide thermal value specified after settlement of insulation.
   3. Do not blow insulation into electrical devices and vents.
   4. Provide minimum clearance around recessed lighting fixtures as approved by local code.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Field Tests And Inspections:
   1. Upon completion of installation, visually inspect each insulated area and verify that all insulation is complete and properly installed.

C. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
   1. Correct any work found not complying with contract document requirements at no additional cost to the Owner.

3.07 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

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SECTION 07 2216
VENTED NAILBASE INSULATION PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vented nailbase insulation panel system as described in Contract Documents.

1.02 RELATED REQUIREMENTS:

A. Section 06 1000: Roof decking, blocking, and nailers

B. Section 07 3113: Asphalt shingles and underlayment installed over vented nailbase system.

C. Section 07 6200: Aluminum fascia and soffit

D. Section 07 7100: Ridge and soffit vents for ventilated nailbase.

1.03 REFERENCE STANDARDS

A. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Insulation Board.

B. ASTM D 312 - Standard Specification for Asphalt Used in Roofing.

C. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.

D. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

E. ASTM E 2114-01 - Standard Terminology for Sustainability Relative to the Performance of Buildings

F. ASTM E 2129-01 - Standard Practice for Data Collection for Sustainability Assessment of Building Products.

G. UL 263 - Fire Tests of Building Construction and Materials.

H. UL 790 - Standard Test Methods for Fire Tests of Roof Coverings.

I. UL 1256 – Fire Test of Roof Deck Constructions.

1.04 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

B. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

C. Shop Drawings and Calculations:
   1. Roof plan showing layout of boards, fastening patterns, and ventilation and roof edge details.
   2. Calculations of spacer block percentage of panel area and the Net Free Area per Lin. Ft. of insulation after deducting for spacers.

1.05 QUALITY ASSURANCE

A. Pre-Installation Conferences:
   1. Participate in pre-installation conference as specified in Section 01 3100:
      a. Schedule pre-installation conference prior to commencement of installing insulation with Installer and Manufacturer’s Representative if available.
      b. In addition to agenda items specified in Section 01 3100, review following:
         1) Review installation procedures.
         2) Review coordination of work with related and adjacent work.
         3) Review special details and flashing.

B. Regulatory Agency Approvals:
   1. Panels shall be manufactured to be in compliance with International Code Council (IBC) or other applicable building codes.

2. The ventilated insulation shall be classified by Underwriters Laboratories Inc. as a shingle decking accessory for use with any Class A, B or C asphalt glass mat or asphalt organic shingle. Each bundle of ventilated panels shall bear an Underwriter Laboratory's label.

C. Qualifications:
1. Manufacturer Qualifications: Manufacturer shall be a company that regularly manufactures polyisocyanurate and fully assembled nailbase insulation panels.
2. Installer Qualifications: Firm which has at least three (3) years experience in work of type required by this specification.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:
1. The ventilated insulation shall be protected in the transit by plastic covers and by truck tarps. When material is stored at the jobsite, a reasonably level, drained storage area shall be provided. The insulation shall rest on firm blocking and shall be covered with tarps.
2. Materials shall be delivered in original, unopened packages with labels intact. Exercise care to avoid damage during unloading.
3. Deliver materials in sufficient quantities to allow continuity of work.

B. Storage And Handling Requirements:
1. Store, protect and handle materials in accordance with Manufacturer's recommendations to prevent damage, contamination and deterioration. Keep material free of dirt and other foreign matter.
2. Store in cool, dry area away from sources of heat, flame, ignition and strong oxidizing agents.
3. Following Manufacturer's instructions for protection when handling and cutting insulation.
4. Protect insulation from open flame and keep dry at all times. Replace any panels that become wet before installation.

1.07 FIELD CONDITIONS

A. Ambient Conditions:
1. Do not install insulation on roof deck when water of any type is present. Do not apply roofing materials when substrate is damp or wet.

1.08 WARRANTY

A. Manufacturer Warranty:
1. Manufacturer's Standard Warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Vented Nailbase Manufacturers:
1. Atlas Roofing Corporation, Atlanta, GA www.atlasroofing.com
2. GAF Cornell, www.gaf.com and www.cornellcorporation.com
3. Hunter, www.hunterpanels.com
4. Equal as approved by Architect before bidding. See Section 01 6200.
5. Provide polyisocyanurate roof board insulation from a single manufacturer.

2.02 MATERIALS

A. Design Basis:
1. Vented Air Space: 1½ inches
2. Insulation Thickness: 3 inches
3. Top Layer Thickness: 5/8" minimum
4. Panel size: 4 feet x 8 feet

B. Panels shall consist of a top layer of APA/TECO rated Oriented Strand Board (OSB) core that is laminated, on-line, to a bottom layer of black fiber reinforced faced polyisocyanurate foam insulation. [Minor variances in thicknesses per manufacturer's standards will be allowed].
   1. Polyisocyanurate foam insulation shall conform to ASTM C 1289, Type V.
   2. Compressive Strength: 20 pounds per square inch (138 kPa) Grade 2.
   3. OSB Top layer substrate shall conform to PS2 and shall be as follows:
      a. Type: Standard sheathing grade.
      b. Thickness: 5/8 inch (15.9 mm).
      c. Edge detail: Rabbited.

C. Acceptable Products:
   1. ACFoam Nail Base Nailable Roof Insulation by Atlas Roofing Corporation
   2. ThermaCal®1 Ventilated Roof Insulation Panels by GAF Cornell
   3. Cool-Vent® by Hunter Panels
   4. Equal as approved by Architect before bidding. See Section 01 6200.
      a. Provide polyisocyanurate roof board insulation from a single manufacturer.

2.03 ACCESSORIES

A. Fasteners:
   1. Use fasteners approved or recommended by manufacturer of panels.
   2. FM Approved fasteners for wood deck application.
   3. 3/16 inch (5 mm) shank with oversized heads.
   4. Corrosion resistant finish.
   5. Length of fasteners shall be as recommended by panel manufacturer. Fasteners shall penetrate the structural wood deck a minimum of 1 inch (25 mm).

B. Acceptable Products:
   1. Atlas Nail Base Fasteners by Atlas Roofing Corporation
   2. ThermaCal® Fasteners by GAF Cornell
   3. SIP/WD Panel Fasteners by Hunter Panel
   4. Equal as approved by Architect before bidding. See Section 01 6200.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification Of Conditions:
   1. Prior to all work of this section, carefully inspect installed work of all other trades and verify that all such work is complete to point where installation may properly commence. Examine roof deck for suitability to receive panels. Verify that substrate is dry, clean and free of foreign material that will damage insulation or impede installation.
   2. Verify that roof curbs, nailers, equipment supports, vents and other roof accessories are secured properly and installed in conformance with Contract Documents and submittals.
   3. Verify that deck is structurally sound to support installers, materials and equipment without damaging or deforming work.
   4. Verify that panels may be installed in accordance with original design an manufacturer's recommendations
   5. Discrepancies:
      a. In event of discrepancy, immediately notify Architect.
      b. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

A. General: Install specified insulation using approved mechanical fasteners in accordance with manufacturer´s latest written instructions and as required by governing codes.

B. Install with end joints staggered to avoid having insulation joints coinciding with joints in deck. In multi-layer installations, stagger joints in top and bottom layers.

C. Review construction details and modify end panels to match details. Verify that ventilation space is kept open as shown in Contract Drawings.

D. For application onto wood decks with framing at 24 inches (610 mm) o.c. requires a minimum of 15 fasteners per 4 foot by 8 foot (1220 mm by 2440 mm) panel. For application onto wood decks with framing at 16 inches (610 mm) o.c. or 32 inches (1220 mm) requires a minimum of 16 fasteners per 4 foot by 8 foot (1220 mm by 2440 mm) panel.

E. Only install as many panels per day that can be covered the same day by a completed roof covering material.

F. Do not overtighten fasteners, which will cause variations in edge heights and firmness of panels.

3.04 FIELD QUALITY CONTROL

A. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:

B. Correct any work found not complying with contract document requirements at no additional cost to the Owner.

3.05 CLEANING / PROTECTION

A. Waste Management:
   1. Remove from site debris resulting from work of this Section.

B. Do not leave installed insulation exposed to weather. Cover and waterproof with completed roof system immediately after installation.
   1. Temporarily seal exposed insulation edges at the end of each day.
   2. Remove and replace installed insulation that has become wet or damaged with new insulation.
   3. Cover the top and edges of unfinished roof panel work to protect it from the weather and to prevent accumulation of water in the cores of the panels.

C. Protect installed insulation and roof cover from traffic by use of protective covering materials during and after installation

END OF SECTION

SECTION 07 3113
ASPHALT SHINGLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Asphalt shingle roofing.

B. Flexible sheet membranes for eave protection, underlayment, and valley protection.

C. Metal flashing.

1.02 DEFINITIONS

A. Flame Spread Classification: Categories as per ASTM E84/UL 723 or CAN/ULC-S102:
   1. Class A: Highest fire-resistance rating for roofing as per ASTM E108. Indicated roofing is able to withstand severe exposure to fire exposure to fire originating from sources outside building.
   2. Class B: Fire-resistance rating indicating roofing materials are able to withstand moderate exposure to fire originating from sources outside of building.
   3. Class C: Fire-resistance rating indicating roofing materials are able to withstand light exposure to fire originating from sources outside of building.

B. Four Wind Zones (Florida Building Code) (Hurricane-Prone Regions and Wind-Borne Debris Region):
   1. Special Protection Zone.
   2. High Velocity Hurricane Zone (HVHZ): Miami-Dade and Broward counties.
   3. Wind-Borne Debris Region.
   4. Panhandle Protection Provision Zone.

C. Wind Speed (IBC):
   1. Hurricane-Prone Regions: Areas vulnerable to hurricanes defined as:
      a. U.S. Atlantic Ocean and Gulf of Mexico coasts and Hawaii where basic wind speed is greater than 90 mph.
   2. Wind-Borne Debris Region: Portions of hurricane-prone regions that are within 1 mile of coastal mean high-water line where basic wind speed is 110 mph or greater, or Hawaii.

D. Wind Uplift: Wind-induced forces on roof system or components in roof system. Wind uplift generally includes negative pressure component caused by wind being deflected around and across surfaces of building and positive pressure component from air flow beneath roof deck.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

B. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2017.

C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

D. ASTM D3019/D3019M - Standard Specification for Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, and Fibered; 2017.

E. ASTM D3161/D3161M - Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method); 2020.

F. ASTM D3462/D3462M - Standard Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules; 2019.

G. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing; 2016a (Reapproved 2021).

H. ASTM D7158/D7158M - Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method); 2020.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

J. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings; 2020a.

K. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL (DIR) - Online Certifications Directory; Current Edition.

M. UL 1897 - Uplift Tests for Roof-Covering Systems; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

N. UL 2218 - Standard for Impact Resistance of Prepared Roof Covering Materials; Current Edition, Including All Revisions.

O. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

Q. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data indicating material characteristics, performance criteria, and limitations.

C. Shop Drawings: For metal flashings, indicate specially configured metal flashings, jointing methods and locations, fastening methods and locations, and installation details.

D. Samples: Submit two samples of each shingle color indicating color range and finish texture/pattern; for color selection.

E. Manufacturer's Installation Instructions: Indicate installation criteria and procedures.

F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

G. Certificates:
   1. Installers:
      a. Provide current Certification for completion of certified training from Shingle Manufacturer.
      b. Installer's signed certificate stating roofing system complies with Contract Documents performance requirements and work only performed by trained and authorized personnel in those procedures.

H. Tests And Evaluation Reports:
   1. Manufacturer's test reports.
   2. Wind speed coverage for warranted wind speed.
   3. High wind reports and approvals if required by AHJ.

I. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

J. Special Procedure Submittals:
   1. Contact Owner’s Representative (FM Group or Project Manager) for following information:
      a. Installer to include following mandatory information to be added to ‘Roofing Manufacturer System Warranty’ submitted with Closing Documents.
         1) Name of Owner (name of FM Group)
            _____
         2) Mailing Address (FM office address)
            _____

3) Building Property ID (unique 7 digit identifier)
_____
4) Project site address:
_____
5) Roof Completion Date
_____
6) Any addition data required from Manufacturer.

b. Installer to include following mandatory information to be added to 'Roof Installer Workmanship Warranty' submitted with Closing Documents:
1) Name of Owner (name of FM Group)
_____
2) Mailing Address (FM office address)
_____
3) Building Property ID (unique 7 digit identifier)
_____
4) Project site address:
_____
5) Roof Completion Date
_____
6) Any addition data required from Manufacturer.

K. Qualification Statement:
1. Installer:
a. Asphalt Shingles:
1) Provide Qualification documentation.

L. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
a. Warranty Documentation:
1) Asphalt Shingles:
(a) Final, executed copy of 'Roofing Manufacturer System Warranty' including wind speed coverage and required Owner mandatory information.
(b) Final, executed copy of 'Roof Installer Workmanship Warranty' including required Owner mandatory information.
2) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.
b. Record Documentation:
1) Manufacturers Documentation:
(a) Manufacturer's literature.
(b) Color selections.
(c) Test and evaluation reports.
2) Roofing Inspection Documentation:
(a) Include copy of roof inspection report.
3) Certificate: Installer statement of compliance for performance requirements.
4) Certificate: Installer completion of certified training.
5) Test And Evaluation Report: UL fire-resistance rating test report.
6) Test And Evaluation Report: NFPA 101 Class A approval.
7) Test And Evaluation Report: Wind resistance requirements required.

M. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements for additional provisions.
2. Extra Shingles: 100 sq ft; (1) Square minimum of each type and color of bundled shingles.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:
   a. Asphalt Shingles:
      1) Asphalt shingles are required to be produced under quality control program administered by inspection agency currently accredited by ICBO ES or recognized by National Evaluation Service, Inc. Quality control manual developed in consultation with approved agency, and complying with ICBO ES Acceptance Criteria for Quality Control Manuals (AC10), must be submitted.
   b. Underlayment:
      1) Underlayment is required to be manufactured under approved quality control program with inspections by inspection agency accredited by International Accreditation Service (IAS) or otherwise acceptable to ICC-ES.
      2) Quality documentation complying with ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted for roof underlayment.
2. Roof Installer Foreman Qualifications:
   a. Requirements of Section 01 4301 applies but not limited to the following:
      1) Provide documentation if requested by Architect.
         (a) Approved and authorized by Roofing Manufacturer to install Manufacturer's product and eligible to receive Manufacturer's warranty before bid.
         (b) Completed Shingle Manufacturer's certified trained.
         (c) Have thorough knowledge of installing asphalt shingle roofing and have minimum of five (5) years roofing experience.
         (d) Current license for the city, county, and state where project is located and license for specific type of roofing work to be performed.
         (e) Roofing Installer's foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
         (f) Flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.
3. Roof Installer:
   a. Provide 'Roof Installer Workmanship Warranty' as specified in Warranty in Part 1 of this specification.

B. Pre-Installation Conference:
   1. Participate in MANDATORY pre-installation conference:
      a. Roofing Installer's Foreman and those responsible for installation of roofing to be in attendance. Include Shingle Manufacturer's Representative if available.
   2. Schedule pre-installation conference at project site after completion of the installation of roof sheathing but before installation of any roofing system component.
   3. In addition to agenda items specified in Section 01 3100, review following:
      a. Review if Project is in high wind area.
      b. Review if Project could have ice dam problems.
      c. Review if Project could have fungus-algae resistance problems.
      d. Review Shingle Manufacturer's ventilation requirements.
      e. Review Shingle Manufacturer's Ambient Conditions requirements.
      f. Review existing roof conditions including moisture on deck, protruding deck fasteners, specified gaps between sheathing, and other items affecting issuance of roofing warranty.
      g. Review proper valley, flashing, penetrations, secondary underlayment, sealants, and nailing requirements.
      h. Review racking installation method is not permitted.
      i. Review steeple base secondary underlayment installation under Steeple.
      j. Review Cleaning and Disposal requirements.
      k. Review Special Procedure Submittal for Warranty Information to be given to Manufacturer before Manufacture will issue Roof Warranty by Installer.
      l. Review safety issues.

C. Sequencing:
   1. Sequence of Roofing Materials (see valley flashing details in Contract Drawings):
      a. Apply continuous 12 inches (300 mm) wide strip at edge of eaves and rakes of secondary underlayment.
      b. Metal drip edge.
      c. Secondary underlayment.
      d. Apply three (3) continuous 36 inch (900 mm) wide sheets of secondary underlayment in valley.
      e. Install one (1) continuous 36 inch (300 mm) wide strip of primary underlayment atop secondary underlayment and centered over valley.
      f. Install formed valley metal over strip of primary underlayment.
      g. Apply 12 inches (300 mm) wide strips of secondary underlayment lapping nailed edge of formed valley metal 3 inches (75 mm).
      h. Apply continuous 36 inch (900 mm) wide sheets of secondary underlayment at app remaining shingle roof areas, entire deck.
      i. Primary underlayment.
      j. Asphalt shingles.
      k. Counter flashings over step flashing.
   2. Coordinate sequencing of products furnished in Section 07 7100: 'Roof Specialties'.

1.06 FIELD CONDITIONS

A. Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.

B. Do not install shingles, eave protection membrane, underlayment, or sealants when surface, ambient air, or wind chill temperatures are below 45 degrees F.

C. Shingles:
   1. Do not install shingles at lower temperatures than allowed by Shingle Manufacturer for application.

D. Underlayment:
   1. Install self-adhering sheet underlayment within range of ambient and substrate temperatures recommended by manufacturer.

1.07 WARRANTY

A. Special Warranty:
   1. Shingle Manufacturer's special forty (40) year minimum labor and material warranty written for The Church of Jesus Christ of Latter-day Saints program, including but not limited to:
      a. CertainTeed:
         1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship.
         2) Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
      b. GAF:
         1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship.
         2) Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.
      c. Malarkey:
         1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship.

2) Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.

d. Owens Corning:

1) First ten (10) years minimum of warranty will provide for full replacement cost, including tear-off and disposal, for any failure, including material defects and workmanship.

2) Remaining thirty (30) years of warranty will provide for pro-rated replacement cost.

2. Standard Wind Areas:

a. Roofing system will resist blow-offs in winds up to 110 mph (177 kph) for ten (10) years when installed as specified below.

b. Meet requirements of ASTM D3161/D3161M UL Class D.

3. Algae resistance for fifteen (15) years.

4. Roof Installer Workmanship Warranty:

a. Provide ten (10) year workmanship warranty on roofing system and related components, including flashings, and responsible for all repairs to roofing system and related components due to roof installer's own negligence or faulty workmanship:

1) In the event that, during ten (10) year period following installation, Roof Installer defaults or fails to fulfill its obligation in relation to workmanship warranty as specified in Manufacturer's Agreement, Manufacturer will assume that obligation for remainder of ten (10) year period following original installation and Owner shall have no obligation to make or pay for repairs to or materials for roofing system that are necessary due to Roof Installer's negligence or faulty installation during that period.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:

1. Make no deliveries to job site until installation is about to commence, or until approved storage area is provided.
2. Deliver products job site in Manufacturer's original unopened containers or wrappings with labels intact and legible bearing all seals and approvals.
3. Deliver materials in sufficient quantities to allow continuity of work.
4. Remove any material not approved from job site.

B. Storage And Handling Requirements:

1. Storage Requirements:

a. Follow Manufacturer's instructions and precautions for storage and protection of materials.

b. Protect roof materials from physical damage, moisture, soiling, and other sources in a clean, dry, protected location.

c. Stacking:

1) Shingles: Bundles should be stacked flat.

2) Underlayment:

(a) Do not double-stack pallets.

(b) Stack rolls upright until installation.

d. Temperature:

1) Shingles:

(a) Store in covered ventilated area at maximum temperature of 110 deg F (43 deg C).

(b) Use extra care in handling shingles when temperature is below 40 deg F (4.4 deg C).

2) Underlayment: Store in area with temperature between 40 deg F and 100 deg F (4.4 deg C and 38 deg C).

e. Unacceptable Material:

1) Remove from job site materials that are determined to be damaged by Architect or by Roofing Manufacturer and replace at no additional cost to Owner.

2. Handling Requirements:
   a. Handle rolled goods to prevent damage to edge or ends.
3. Roof Top Loading:
   a. Lay shingle bundles flat.
   b. Do not bend over ridge.

PART 2 PRODUCTS

2.01 REGULATORY AGENCY SUSTAINABILITY APPROVALS

A. Building Codes:
   1. Meet requirements for NFPA 101 Class A roof assembly.
   2. Roof system will meet requirements of all federal, state, and local codes having jurisdiction.

B. Fall Protection: Meet requirement of fall protection as required by federal, state, and local codes having jurisdiction.

C. Fire Characteristics:
   1. Provide shingles and related roofing materials with 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:
      a. Exterior Fire-Test Exposure: Class A; UL 790, CAN/ULC-S102, or ASTM E108, for application and roof slopes indicated.
         1) Materials shall be identified with appropriate markings of applicable testing agency.

D. Impact Resistance:
   1. Meet UL 2218 impact resistant testing.

E. Wind Resistance:
   1. Meet ASTM D3161/D3161M for wind resistance.
      a. Installation shall comply with IBC Table 1507.2.7, 'Attachment'.

F. Wind Speed:
   1. As required to meet local codes having jurisdiction.

G. Wind Uplift Resistance:
   1. Meet UL 580 wind uplift of roof assemblies.
   2. Meet UL 1897 uplift test for roof covering systems.
   3. Meet ASTM D7158/D7158M for wind resistance for uplift force/uplift resistance.

2.02 MANUFACTURERS

A. Manufacturer Contact List:
   1. CertainTeed Roofing Products, Valley Forge, PA www.certainteed.com.
      a. Contact Information: Wendy Fox, (800) 404-9880, wfox@dataworksintl.com.
   2. GAF Materials Corp., Wayne, NJ www.gaf.com.
      a. Contact Information: Dean Mathews (cell) (503) 410-1234, dean.mathews@gaf.com
   3. Malarkey Roofing Products, Portland OR www.malarkeyroofing.com
      a. Contact Information: John Kouba (503) 283-1191, mobile (503) 260-8980, john.kouba@holcim.com
   4. Owens Corning, Toledo, OH www.owenscorning.com.
      a. Duration Premium shingles are available in all areas of the USA and Canada including all Duration Premium colors under Church contract. Request shingles through local distribution. Any distribution questions, contact Area Sales Manager.
      b. For all other questions, Contact: Robert Hill (801) 244-0630 Robert.Hill@owenscorning.com.

2.03 APPROVED INSTALLERS

A. Contact manufacturers for a list of approved installers servicing the project area.
   1. CertainTeed:
      a. American Roofing Co. (AMCO), (801) 269-1276
      b. Fortress Roofing, (801) 509-8625
      c. JTS Roofing Inc., (801) 627-6450
      d. Mountain Peak Builders, Inc., (435) 787-4174
      e. North Face Roofing, Inc., (801) 455-8492
      f. Perkes Roofing, (801) 731-6918
      g. Triple C Roofers, (801) 655-3583
      h. VIP Roofing, (801) 631-6182
   2. GAF:
      a. American Roofing Co. (AMCO), 269-1276
      b. Aspen Roofing, Salt Lake City, UT – Contact: Jon Brady (801) 483-1660.
      c. Capital Roofing Service, Inc., Sandy, UT – Contact: Paul Hitzman (801) 562-5568.
      d. Fortress Roofing, Murray, UT – Contact: Adam Cordon (801) 509-8625.
      e. Knockout Roofing, Riverton, UT – Contact Jared Gran (801) 604-4090.
      f. Lifetime Roofing, West Point, UT - Parker Cornably (801) 200-7426.
      g. Parrish Construction, American Fork, UT – Contact: Tyler Parrish (801) 787-3633.
      h. RSW Plus, Nephi, UT – Contact: Rick White (435) 623-1719.
      i. Skyline Roofing Inc., La Verkin, UT - Contact: Adam Stout (435) 635-3172.
      j. Wesley Green Roofing, UT – Contact: Scott Horsepool (801) 486-3411.
   3. Owens-Corning:
      a. American Roofing Co. (AMCO), 269-1276
   4. Malarkey:
      a. American Roofing Co. (AMCO), Contact: Nate Yorgason (801) 269-1276, nate@amcoroof.com
      b. North Face Roofing, Contact: Craig Peters (435) 214-7656, craig@northfaceroofs.com
      c. Skyline Roofing, Contact: Adam Stout (435) 635-3172, adamstout12@msn.com
      d. Stout Roofing, Contact: Kelly Casey (435) 635-4288, kellyc@stoutroofing.net
      e. VIP Roofing, Contact: Max Ker (801) 631-6182, max@vip-roofing.com

2.04 ASPHALT SHINGLES

A. Asphalt Shingles: Asphalt-coated glass felt, mineral granule surfaced, complying with ASTM D3462/D3462M.
   1. Fire Resistance: Class A, complying with ASTM E108.
   2. Wind Resistance: Tested in accordance with ASTM D3161/D3161M.
      a. Standard Wind Areas: ASTM D3161/D3161M UL Class D.
   3. Impact Resistant Shingles: Meet requirements of UL 2218 Class 4 Impact, ASTM E108 Class A Fire Resistance, ASTM D3161/D3161M Class F Wind, ASTM D7158/D7158M Class H Wind, ASTM D3018/D3018M Type 1, ASTM D3462/D3462M, and UL 790 Class A Fire Resistance.
   4. Secondary Underlayment: Meet requirements of ASTM D1970/D1970M and UL 790 Class A Fire Resistance.
   5. Primary (Synthetic) Underlayment: Meet requirements of ASTM D226/D226M and ASTM D4869/D4869M (physical properties only) or ASTM D1970/D1970M and ASTM E108 Class A Fire.
   6. Algae resistant.
      a. Use compatible flashing and trim materials to avoid electrolysis problem with material used in algae shingles.
   7. Color: As selected by Architect.
   8. Approved Manufacturers and Products.

a. CertainTeed:
   1) Shingles:
      (a) Standard Wind: Landmark PRO / Landmark Premium.
      (b) Hip And Ridge Shingles: Shadow Ridge Mountain Ridge/Shadow Ridge ClimateFlex (impact resistant)
   2) Primary Underlayment Under Shingles:
      (a) Synthetic Underlayment: DiamondDeck.
   3) Secondary Underlayment Under Shingles:
      (a) WinterGuard Granular.
      (b) WinterGuard Sand.
      (c) WinterGuard PRO (D) GRACE VYCOR series
      (d) Use High Temperature / High Tack secondary underlayment under valleys.
b. GAF:
   1) Shingles:
      (a) Standard Wind: Timberline HDZ.
      (b) Hip And Ridge Shingles: TimberTex (East), TimberCrest (West), Seal-A-Ridge (West)
   2) Primary Underlayment Under Shingles:
      (a) Synthetic Underlayment: Tiger Paw.
      (b) Equal alternative: Deck Armor
   3) Secondary Underlayment Under Shingles:
      (a) Weatherwatch.
      (b) StormGuard.
      (c) Use High Temperature / High Tack secondary underlayment under valleys.
c. Malarkey:
   1) Shingles:
      (a) Standard Wind: Legacy Scotchgard
      (b) Hip And Ridge Shingles: EZ Ridge (8" wide) or EZ Ridge XT (10" wide)
   2) Primary Underlayment Under Shingles:
      (a) Synthetic Underlayment: Secure Start SG #1030 or Secure Start Plus #1031
      (b) Polymer Modified SBS Underlayment: Right Start UDL.
   3) Secondary Underlayment Under Shingles:
      (a) Arctic Seal Self-Adhering underlayment #401.
      (b) Use High Temperature / High Tack secondary underlayment under valleys.
d. Owens Corning:
   1) Note:
      (a) Duration Flex shingles are available in all areas of the USA and Canada including all Duration Flex colors under Church contract. Request shingles through local distribution.
      (b) Any questions, contact Manufacturer's Area Sales Manager.
   2) Shingles:
      (a) Standard Wind: Duration Flex shingles.
      (b) Hip And Ridge Shingles: DecoRidge Hip & Ridge.
   3) Primary Underlayment Under Shingles:
      (a) Synthetic Underlayment: Deck Defense High Performance Roof Underlayment.
   4) Secondary Underlayment Under Shingles:
      (a) Weatherlock G Granulated Self-Sealing Ice & Water Barrier.
      (b) Weatherlock Specialty Tile & Metal for High Temperature.
      (c) Weatherlock Cold Climate for cold weather adhesion and flexibility.
      (d) Use High Temperature / High Tack secondary underlayment under valleys.

2.05 SHEET MATERIALS

A. Elastomeric Roofing Sealant:
   1. Design Criteria:
      a. Meet requirements of ASTM D3019/D3019M.
      b. Non-asphalt roofing cement (not permitted).
      c. Elastomeric.
      d. Cold temperature pliability.
      e. Compatible with roof penetration boots.

B. Fasteners:
   1. Primary Underlayment:
      a. Corrosion resistant roofing nails with one inch (25 mm) diameter head and 3/4 inch (19 mm) long shank minimum.
         1) If shingles applied as underlayment is laid, use metal or plastic head Simplex roofing nails.
         2) If shingles not applied as underlayment is laid, use plastic head only.
      b. Staples not permitted.
   2. Shingles:
      a. Design Criteria:
         1) Meet following requirements for nails:
            (a) Comply with ASTM F1667, Type I, Style 20-Roofing Nails.
            (b) Eleven gauge galvanized steel or equivalent corrosion-resistant roofing nail.
            (c) Nail head sizes: 3/8 inch (9.5 mm) nominal diameter.
            (d) Sufficient length to penetrate through roof sheathing 1/4 inch (6 mm) or 3/4 inch (19 mm) minimum into solid wood decking.
            (e) Hot-dipped galvanized or electroplated fasteners comply with requirements of ASTM A153/A153M, Class D.
            (f) Stainless-steel fasteners meet requirements of Type 304 (UNS S30400) or Type 316 (UNS S31600).
      b. General:
         1) Hot-dipped galvanized, electroplated non-corrosive gun-driver nails, or stainless-steel fasteners may be used.
         2) Fasteners within 15 miles (24.1 km) of coastal areas (oceanside) applications must use hot-dipped galvanized or stainless steel.
         3) All exposed fasteners (including ridge shingles) must use hot-dipped galvanized or stainless steel.
         4) Staples not permitted:
            (a) Architect/Roof Consultant may approve in writing, staple gun that installs exposed fasteners with staples.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions prior to starting this work.

B. Verify that roof deck is of sufficient thickness to accept fasteners.

C. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.

D. Verify roof openings are correctly framed.

E. Verify deck surfaces are dry, free of ridges, warps, or voids.

3.02 PREPARATION

A. Seal roof deck joints wider than 1/16 inch as recommended by shingle manufacturer.

B. At areas where eave protection membrane is to be adhered to substrate, fill knot holes and surface cracks with latex filler.

C. Broom clean deck surfaces before installing underlayment or eave protection.

D. Install eave edge flashings tight with fascia boards, weather lap joints 2 inches and seal with roof cement, and secure flange with nails spaced 8 inches on center.

E. Protection Of In-Place Conditions:
   1. Install only as much roofing as can be made weathertight each day, including flashing and detail work.

F. Surface Preparation:
   1. Clean roof deck:
      a. Remove dirt, protruding nails, shingle nails, and debris, before installation of underlayment.
   2. Roof deck must be dry to help prevent buckling of deck, which can result in deck movement and damage to primary underlayment.
   3. Following Manufacturer’s recommendations for placing materials on roof.
      a. Prevent material from sliding off roof.

3.03 INSTALLATION - GENERAL

A. General:
   1. Schedule and execute work without exposing interior building areas to effects of inclement weather. Protect existing building and its contents against all risks.

B. Sequence of Roofing Materials as shown and noted on Contract Drawings:
   1. 12 inch strip Secondary Underlayment at Eave.
   2. Metal Drip Edge.
   3. General Secondary Underlayment at entire roof deck.
   4. High temperature Valley Secondary Underlayment (8' - 6" (2.62 m) wide strip of Secondary Underlayment (3 strips) in Valleys applied over sheathing).
   5. High temperature Valley Secondary Underlayment (36 inch (915 mm) wide Primary Underlayment under Valley Metal).
   6. Valley Metal (24 inch (610 mm) wide valley metal 10 ft (3.05 m) lengths).
   7. 12 inch strip of high temperature Secondary Underlayment over nailed edges (of Valley Metal).
   8. General Primary Underlayment.
   9. Asphalt Shingles, Step Flashings.
   10. Counter Flashing.

3.04 INSTALLATION - UNDERLAYMENT

A. General:
   1. Temporary Roof:
      a. Do not use permanent underlayment installation as temporary roof.
      b. If temporary roof is used, remove completely before installation of permanent underlayment.
   2. Follow Shingle Manufacturer's recommendations for installation of primary and secondary underlayment, particularly at eaves, rakes, low-slopes, and penetrations, unless specified installation procedures and Contract Drawing details are more stringent.
   3. Avoid scuffing underlayment that can compromise surface and cause leaking. If scuffing occurs, following Manufacturer’s recommendation for repair.
   4. Staples are not permitted.
   5. Weather conditions:
      a. Do not leave underlayment exposed to weather more than thirty (30) days after beginning of underlayment installation even if Manufacture allows longer period of time.
      b. If underlayment is exposed for more than thirty (30) days after beginning of underlayment installation, treat as temporary roof under first paragraph above.
      c. If moisture is deposited on exposed underlayment, obtain written approval from Shingle Manufacturer's Representative before installing shingles.

6. Install valley secondary underlayment, valley primary underlayment, and valley metal after installation of general secondary underlayment, but before installation of general primary underlayment.

B. Primary Underlayment:
   1. Apply 48 inch (1 200 mm) wide courses over complete deck, including areas covered with secondary underlayment unless specified otherwise.
      a. Overlap underlayment before fastening.
      b. Maintain end laps of 6 inch (150 mm) and side laps of 3 inch (76 mm).
      c. Stop primary underlayment between 3 and 6 inches (75 and 150 mm) of inside edge of strip of secondary underlayment installed over edge of formed valley metal.
   2. Nailing Synthetic Underlayment:
      a. Use low-profile plastic or steel cap corrosion resistant nails with 1 inch (25 mm) diameter heads to fasten underlayment in place. (Fastening underlayment without caps is not permitted).
      b. Nails must be driven properly. Improperly driven fasteners such as over-driving, under-driving and nails driven at an angle are not permitted.
      c. Fasteners should be long enough to penetrate at least 3/4 inch (19 mm) into roof sheathing. Fasteners must be lie flush to roof deck at 90 degree angle to roof deck and tight with underlayment.
      d. Do not nail through metal flashing, except drip edge, when installing primary underlayment.
      e. Follow Shingle Manufacturer’s installation instructions for following:
         1) Securing underlayment to roof deck adjusting for roof slope nailing requirements.
         2) Side lap, end lap, and overlapping nailing requirements.
         3) Rake and eave nailing requirements.
         4) High wind condition nailing requirements.
         5) Sealants recommendations.

C. Secondary Underlayment:
   1. Under Shingles:
      a. Lap end joints 6 inches (150 mm) and side joints 3 inch (76 mm) minimum.
      b. Apply continuous 12 inches (300 mm) wide strip at edge of eaves and rakes before installing drip edge.
      c. Apply two (2) 36 inch (900 mm) wide courses along eaves and rakes as described in Contract Documents with first course overlapping drip edge and 12 inches (300 mm) wide previously applied strip.
      d. Apply 36 wide courses along entire roof deck area.

D. Valley Underlayment: (High Temperature Secondary Underlayment)
   1. Apply three (3) continuous 36 inch (900 mm) wide sheets of secondary underlayment in valley lapped to provide 102 inch (2 590 mm) wide covered area centered over valley.
   2. Apply one (1) continuous 36 inch (300 mm) wide strip of primary underlayment atop secondary underlayment and centered over valley.
   3. Install formed valley metal over strip of primary underlayment.
      a. Nail top of each section and lap 8 inches (200 mm) in direction of flow.
      b. Seal laps with continuous bead of elastomeric roofing sealant.
      c. Secure edges of valley metal with fasteners spaced at 12 inches (300 mm) maximum on center and approximately 1/2 inch (13 mm) in from edge of metal.
   4. Install 12 inches (300 mm) wide strips of secondary underlayment lapping nailed edge of formed valley metal 3 inches (75 mm).

3.05 INSTALLATION - SHINGLES

A. Before installing shingles, inspect underlayment and metal installation with Architect and Owner . Correct improperly installed and damaged material before beginning shingle installation.

B. Racking installation method is not permitted by Owner and will be considered non-conforming work.

C. Starter shingles:
   1. Manufacturer’s starter shingles are required for Shingle Warranty.
   2. Install shingles at eaves and rakes in accordance with Shingle Manufacturer’s instructions.
   3. Cut shingles in accordance with Shingle Manufacturer's instructions, or use approved starter course.
   4. Nail to eave granule side up in continuous mastic bed with cut edge down-slope and edge overhanging eave 3/8 inch (9 mm) so sealing tabs are at edge of eave.
   5. Install shingles with maximum exposure recommended by Shingle Manufacturer.
   6. Lay first course directly over starter strip with ends flush with starter strip at eaves and so joints in starter strip are offset 4 inches (100 mm) minimum from joints in first course.

D. Lay shingles so end joints are offset in accordance with Shingle Manufacturer's installation procedures.

E. Ensure alignment by snapping chalk line at least each fifth course to control horizontal and vertical alignment.

F. Run courses true to line with end joints properly placed. Leave shingles flat without wave and properly placed.

G. Hip and ridge shingles:
   1. Manufacturer’s hip and ridge shingles are required for Shingle Warranty.
   2. Install specified hip and ridge shingles in accordance with Shingle Manufacturer's instructions.
   3. Run ridge shingles as directed by Architect.

H. Nailing:
   1. General:
      a. Six (6) Nail Pattern as recommended by Shingle Manufacturer for Shingle Warranty in each shingle.
      b. Place in relation to top edge of shingle as required by Shingle Manufacturer.
      c. Place nails one inch (25 mm) from each end of shingle and remainder evenly spaced between.
      d. Should any nail fail to penetrate sheathing by 1/4 inch (6 mm) minimum, drive additional nail nearby.
   2. Nailing guns:
      a. Nails must be driven properly. Improperly driven fasteners such as over-driving, under-driving and nails driven at an angle are not permitted.
      b. Adjust nail gun pressure for nailing flush and tight to deck without cutting shingle surface.
      c. Drive nails perpendicular to shingle surface so nail head is flat against shingle.
      d. Should any nail fail to penetrate sheathing by 1/4 inch (6 mm) minimum, drive additional nail nearby.

I. Hand-Sealing:
   1. If ambient temperature or exposure to sun will not be sufficient to secure adhesive strip to under-lying shingle within one week, hand seal shingles with elastomeric roofing sealant.

J. Over valley metal:
   1. Do not drive nails through valley metal.
   2. Run chalk line so valley metal will be exposed 6 inches (150 mm) wide at top and diverge 3/32 inch (one mm) per ft (300 mm) down to eaves.
   3. Neatly trim shingles to this line.
   4. Seal trimmed shingle edges to valley metal with continuous bead of elastomeric roofing sealant applied within one inch (25 mm) of shingle edge.

K. Vent pipe sleeve flange:

1. Vent pipe sleeve flange as specified in Section 07 6310.
2. Fit shingles under lower edge and over sides and upper edge.
3. Set vent pipe flange in elastomeric roofing sealant.
4. Embed shingles in elastomeric roofing sealant where they overlap flange.
5. Apply bead of elastomeric roofing sealant at junction of vent pipe and vent flashing.

3.06 FIELD QUALITY CONTROL

A. Non-Conforming Work:
   1. Correct any work found defective or not complying with Contract Document requirements at no additional cost to the Owner.
   2. Raking installation method is not permitted by Owner and will be considered to be not complying with Contract Document requirements and must be corrected at no additional cost to Owner.

3.07 CLEANING

A. General:
   1. All tools and unused materials must be collected at end of each workday and stored properly off finished roof surface and protected from exposure to elements.
   2. Leave metals clean and free of defects, stains, and damaged finish.
      a. Replace fascia metal that is scratched through finish to base metal.
   3. Properly clean finished roof surface after completion.
   4. Verify drains and gutters are not clogged.
   5. Clean shingles and building of soiling caused by this installation.
   6. Clean and restore all damaged surfaces to their original condition.

B. Waste Management:
   1. Disposal:
      a. All work areas are to be kept clean, clear and free of debris always.
      b. Do not allow trash, waste, or debris to collect on roof. These items shall be removed from roof daily.
      c. Remove debris resulting from work of this Section from roof and site. Dispose of or recycle all trash and excess material in manner conforming to current EPA regulations and local laws.

3.08 PROTECTION

A. Do not permit traffic over finished roof surface; protect roofing until completion of project.

END OF SECTION 07 3113

SECTION 07 5419
POLYVINYL-CHLORIDE ROOFING: PVC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. PVC roofing membrane with flashings and other components to comprise total roofing system as described in Contract Documents including:
   1. 80 mil Single-ply membrane.
   2. Gypsum Cover Board
   3. Poly-isocyanurate tapered insulation system with crickets (tapered where shown on Contract Drawings). R-30 minimum thermal requirement at all areas.
   4. Vapor Retarder / Air Barrier.
   5. 5/8” Gypsum thermal barrier.

B. Metal flashing.

1.02 RELATED REQUIREMENTS

A. Section 06 0573 - Wood Treatment

B. Section 06 1000 - Rough Carpentry

C. Section 07 6200 - Sheet Metal Flashing and Trim

D. Division 22 for roof drains and piping

E. Divisions 22,23,26 for plumbing, mechanical, and electrical equipment, penetrations, curbs, and related work.

1.03 REFERENCES

A. Association Publications:
   1. American National Standards Institute / Single Ply Roofing Industry:
      a. ANSI/SPRI/FM 4435/ES-1 2003, 'Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems'.
      b. ANSI/SPRI WD-1 'Wind Design Standard for Roofing Assemblies'.
   2. FM Global Resource Catalogue by FM Global, Norwood, MA www.fmglobal.com.
      a. Approval Guide:
         1) Factory Mutual Standard 4470 - Approval Standard for Class 1 Roof Covers.
      b. Property Loss Prevention Data Sheet 1-28, ‘Wind Design’ (latest edition).
      c. Property Loss Prevention Data Sheet 1-29, ‘Roof Deck Securement and Above-Deck Components’ (latest edition).
      d. Property Loss Prevention Data Sheet 1-49, ‘Perimeter Flashing’ (latest edition).

B. Definitions:
   1. Flame Spread Classification: Categories as per ASTM E84/UL 723 or ULC 102:
      a. Class A: Highest fire-resistance rating for roofing as per ASTM E108. Indicated roofing is able to withstand severe exposure to fire exposure to fire originating from sources outside building.
      b. Class B: Fire-resistance rating indicating roofing materials are able to withstand moderate exposure to fire originating from sources outside of building.
      c. Class C: Fire-resistance rating indicating roofing materials are able to withstand light exposure to fire originating from sources outside of building.

C. Reference Standards:
   1. ASTM International:
      a. ASTM C1289-18a, ‘Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board'.
      b. ASTM C1303/C1303M-15, ‘Standard Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation’.

D. ASTM D4434/D4434M-15, ‘Standard Specification for Polyvinyl Chloride Sheet Roofing’.

a. ASTM E84-18b, ‘Standard Test Method for Surface Burning Characteristics of Building Materials’.
b. ASTM E108-17, ‘Standard Test Methods for Fire Tests of Roof Coverings’.

2. International Building Code (IBC) (2021 edition or latest edition adopted by AHJ):
   a. Chapter 15, 'Roof Assemblies And Rooftop Structures':
   b. Section 1507, 'Requirements for Roof Coverings':
      1) 1507.13, ‘Thermoplastic single-ply Roofing’.
3. National Fire Protection Association:
   a. NFPA 101: ‘Life Safety Code’ (2018 or most recent edition adopted by AHJ).

E. Underwriters Laboratories (UL):
1. UL 580: 'Tests for Uplift Resistance of Roof Assemblies' (5th Edition).
2. UL 723, ‘Tests for Safety Test for Surface Burning Characteristics of Building Materials' (11th Edition).
3. UL 790, 'Standard Test Methods for Fire Tests of Roof Coverings' (8th Edition).
4. UL 1897-04, ‘Uplift Tests for Roof Covering Systems’ (7th Edition).
5. UL 2218, 'Standard for Impact Resistance of Prepared Roof Coverings Materials' (2nd Edition).

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Action Submittals:
1. Product Data:
   a. Manufacturer's literature or cut sheet for each element of system.
   b. Manufacturer’s preparation and installation instructions and recommendations.
2. Shop Drawings:
   a. Prepared by Roofing Installer and approved by Roofing Membrane Manufacturer and include following:
      1) Base flashings.
      2) Location and type of penetrations.
      3) Membrane terminations.
      4) Outline of roof and roof size.
      5) Perimeter and penetration details.
      6) Roof insulation:
         (a) Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
         (b) Taper insulation, including slopes.
      7) Special details and materials.
   b. Confirm that specified FM Class and UL Class assembly is appropriate for Project location.
   c. Include approved copy of Manufacturer’s Notice of Award or Assembly Letter.
3. Samples:
   a. Manufacturer’s 4 inch (100 mm) square minimum sample representing actual color, membrane and thickness.

C. Informational Submittals:
1. Certificates:
   a. Installer’s signed certificate stating roofing system complies with Contract Documents performance requirements and work only performed by trained and authorized personnel in those procedures.
   b. Manufactures signed certificate that roof system has been inspected by Technical Service Representative and stating no deviation from system specified or approved shop drawings without written approval by Owner Representative and Manufacture.
2. Test And Evaluation Reports: Submit evidence that roof system has been tested and approved or listed as follows:

a. Submit evidence that roof system has been tested and approved or listed to meet Factory Mutual Research Corporation (FM) Classification required for this Project.
b. Submit evidence that roof system has been tested to meet UL Class requirement required for fire-resistance rating for this Project.

3. Manufacturer Instructions:
   a. Two (2) copies of Roofing Manufacturer's published instructions for Architect and maintain one (1) at job-site.
4. Special Procedure Submittals:
   a. Installer to fill out 'Roof Manufacturer' Installer Workmanship Warranty' and 'Manufacturer System Warranty' from information provided in the Attachment 'Roofing Manufacturer's Information For Architect' from Manufacturer and from Architect. Warranties are to be included in Closeout Submittals.
5. Qualification Statement:
   a. Roofing Manufacturer's certification of Installer.

D. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
   a. Warranty Documentation:
      1) Final, executed copy of 'Roofing Manufacturer System Warranty' including wind speed coverage and required Owner mandatory information.
      2) Final, executed copy of 'Roof Installer Workmanship Warranty' including required Owner mandatory information.
      3) Verify mandatory information as specified in Special Procedure Submittal has been included in Final Warranty.
   b. Record Documentation:
      1) Manufacturers Documentation:
         (a) Record Shop Drawings if requested. Record shop drawings shall be given shop drawing number by Roofing Manufacturer.
         (b) Certificate: Manufacturer Inspection report by Technical Service Representative.
         (c) Certificate: Installer statement of compliance for performance requirements.
         (d) Test And Evaluation Report: UL fire-resistance rating test report.
         (e) Test And Evaluation Report: Factory Mutual Research Classification approval.

1.05 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Requirements:
1. Roof system will meet requirements of all federal, state, and local codes having jurisdiction (AHJ).
2. Fire Characteristics Performance Requirement:
   a. Roof system will achieve UL Class A rating when tested in accordance with ASTM E108 or UL-790:
      1) Materials shall be identified with appropriate markings of applicable testing agency.
3. Thermal Performance Requirement:
   a. Roof system will achieve minimum R value not less than 30.
   b. Canopy areas open below roof to not require a minimum R value.
4. Wind Criteria as per ASCE 7-10:
   a. Basic wind speed (V): 120 mph (Risk Category III)
   b. Wind exposure and importance factor (Iw): B
   c. Wind Design Pressure (p): 31.1 (roof area field)
      52.2 (roof area perimeter)
      78.5 (roof area corners)

5. Perimeter Edge Requirements:
    a. Zone 2 (roof edge perimeter, vertical load direction): 52.2 pounds per square foot
    b. Zone 3 (roof edge corners, vertical load direction): 78.5 pounds per square foot
    c. Zone 4 (wall edge perimeter, horizontal load direction): 33.7 pounds per square foot
    d. Zone 5 (wall edge corners, horizontal load direction): 41.6 pounds per square foot

B. Qualifications:
1. Installers Qualifications:
    a. Provide documentation if requested by Architect:
    b. Roofing Installer shall be approved and authorized by Roofing System Manufacturer to install Manufacturer’s product and eligible to receive Manufacturer’s special warranty before bid.
    c. Roofing Installer shall be able to document roofing membrane installation for five (5) year minimum.
    d. Roofing Installer must have current license for the city, county, and state where project is located.
    e. Roofing Installer must have license for specific type of roofing work to be preformed.
    f. Roofing Installer’s foreman shall be skilled in his trade and qualified to lay out and supervise the Work.
    g. Membrane and flashing installation shall be performed by personnel trained and authorized by Roofing Manufacturer.
    h. Welding equipment shall be provided by or approved by Roofing Manufacturer. Mechanics intending to use equipment shall have successfully completed training course provided by Manufacturer's Technical Representative before welding.
2. Manufacturer Qualifications:
    a. Manufacturer shall manufacture membrane material for five (5) consecutive years.
        1) No product with documented failure will be allowed.
    b. Manufacturer that is UL listed for membrane roofing system used for this Project.
    c. Source Limitations:
        1) Provide roof components including roof insulation and fasteners for roofing system from same Manufacturer as membrane roofing or approved by Roofing Membrane Manufacturer.

C. Pre-Installation Conferences:
1. Participate in MANDATORY pre-installation conference.
    a. Roofing Installer’s Foreman and those responsible for installation of roofing to be in attendance. Include Roofing Manufacturer’s Representative if available.
2. Schedule pre-installation conference at project site after installation of roof deck including pipe and flue penetrations, but before application of any roofing system component.
3. In addition to agenda items specified in Section 01 3100, review following:
    a. Review Manufacturer’s written instructions.
    b. Review if Project is in high wind area.
    c. Review delivery, storage, and handling requirements.
    d. Review ambient conditions requirements.
    e. Review roofing installation requirements including flashing and penetrations.
    f. Review roofing drainage requirements.
    g. Review temporary protections for roofing system.
    h. Review cleaning and disposal requirements.
    i. Review Special Procedure Submittal for Warranty Information to be given to Manufacturer before Manufacture will issue Roof Warranty by Installer.
    j. Review safety issues.
    k. Review field inspections and non-conforming work requirements.
    l. Review protection of membrane by other trades after installation of membrane.

1.06 FIELD CONDITIONS

A. Ambient Conditions:
   1. Temperature ranges shall be within tolerances allowed for material being used.
      a. Roof surface shall be free of ponding water, ice, and snow.
      b. Cold temperature:
         1) Follow Manufacturer's written instructions for cold temperature requirements before applying membrane adhesive:
            (a) Follow specified precautions.
            (b) Expose only enough adhesive to be used as directed by membrane manufacturer:
            (c) Low VOC restrictions (if required by local AHJ): Temperatures to be 40 deg F and rising before applying.
      c. Hot temperature:
         1) Do not expose membrane and accessories to constant temperature in excess of 180 deg F.
   2. Proceed with roofing work when existing and forecasted weather conditions permit.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements:
   1. Make no deliveries to Project until installation is about to commence, or until approved storage area is provided.
   2. Deliver products job site in original unopened containers or wrappings bearing all seals and approvals.
   3. Deliver materials in sufficient quantities to allow continuity of work.
   4. Remove any material not approved from job site.

B. Storage And Handling Requirements:
   1. General:
      a. Follow Manufacturer’s instructions and precautions for storage of materials.
      b. Handle and store roofing materials and place equipment in manner to avoid permanent deflection of roof decking.
      c. Material Safety Data Sheets (MSDS) must be on location always during transportation, storage and application of materials.
   2. Storage Requirements:
      a. Protection:
         1) Protect roof materials from physical damage, moisture, soiling, and other sources in a clean, dry, protected location and with temperature range required by Manufacturer. Protect from direct sunlight.
         2) Provide continuous protection of materials against moisture absorption (Manufacturer’s/Supplier’s shrink wrap is not accepted waterproofing).
         3) Store membrane rolls lying down on pallets fully protected from weather with clean canvas tarpaulins.
      b. Roof Insulation:
         1) Comply with insulation Manufacturer’s written instructions for handling, storing, and protection during installation.
      c. Safety:
         1) Store flammable materials in cool, dry area away from sparks, open flames, or excessive heat. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
         2) Liquid materials such as solvents and adhesives shall be stored off site and installed away from open flames, sparks, and excessive heat.
         3) Site storage is acceptable if liquid materials are placed in a locked, sealed storage container.
         4) Situate equipment and materials so as to preclude danger, disturbance, or interference to public safety and traffic, and to not constitute fire hazard.
      d. Temperature:

1) Store adhesives at temperatures above 40 deg F and below 180 deg F.

e. Unacceptable Material:
1) Remove from job site materials that are determined to be damaged by Architect or by Roofing Manufacturer and replace at no additional cost to Owner.
2) Remove all wet and damaged materials from site.
3) Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

3. Handling Requirements:
a. Select and Handle operating equipment so as not to damage existing construction or new roofing system, or to overload structural system.
b. Handle rolled goods so as to prevent damage to edge or ends.

1.08 WARRANTY

A. Manufacturer Warranty:
1. Roofing Membrane Manufacturer's Special Warranty for:
a. Thirty (30) year no dollar limit (NDL) material and labor warranty covering roofing system, including insulation, components of membrane roofing system and flashing degradation and workmanship.
b. Accidental Puncture Warranty:
1) Membrane Manufacturer's written Accidental Puncture Warranty for up to sixteen (16) hours of Labor to repair punctures after final inspection.
c. Warranty shall include wind speed coverage to 99 mph.

B. Roof Installer Workmanship Warranty:
1. Written five (5) year guarantee covering workmanship and repairs or replacement of work without cost to Owner, counter-signed by Installer and General Contractor from date of installation:
a. Roof Installer Workmanship Warranty must include information required in Attachment 'Warranty Information'.

PART 2 PRODUCTS

2.01 SYSTEM

A. Approved Manufacturers.
1. Carlisle SynTec Incorporated, Carlisle PA www.carlisle-syntec.com. (717) 245-7000:
a. Primary Contact: Greg Petschke (Manager Strategic Accounts), office (800) 479-6832 cell (717) 215-2681 greg.petschke@carlislesyntec.com.
b. Secondary Contact: Kristen Morrow (Strategic Accounts Coordinator), phone (717) 245-7289 kristen.morrow@carlisleccm.com.
c. Secondary Contact: Horner & Associates (Utah, Idaho, Wyoming, and Montana): Tom (801) 842-8305 tom@hornerassocd7.com or Gary (801) 712-0326 gary@hornerassocd7.com.
2. Sika Sarnafil, Canton, MA (800) 576-2358 or (781) 828-5400. www.sikacorp.com.
a. Primary Contact: Steve Moosman, Strategic Accounts, office (801) 575-8648 x7551 cell (801) 201-6269 moosman.steve@us.sika.com.
b. Secondary Contact: Jason Maxwell, Sika National Accounts, (801) 910-9905, maxwell.jason@us.sika.com
c. Secondary Contact: Gary Leavitt, leavitt.gary@us.sika.com
d. Secondary Contact: Don Weston, Weston Group: office (801) 503-4276 don@weston-group.com
3. Versico Roofing Systems (Carlisle Construction Materials, Inc., Carlisle PA www.versico.com (800) 992-7663:
a. Primary Contact: Jeff Kelly, Corporate Accounts Manager: Phone (480) 528-6923 jeff.kelly@versico.com.
b. Secondary Contact: Rose Ednie, phone (843) 274-5452 rose.ednie@versico.com.

c. Secondary Contact (Utah, ID, WY): Justin Spencer, phone (801) 458-7207 justin@division7bec.com; Dan Barker, Phone (801) 668-4960, dan@division7bec.com

B. Design Criteria:
1. General:
a. Installed membrane roofing 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.
b. Membrane roofing and base flashings shall remain watertight.
2. Drainage Requirement:
a. Roof system to provide positive drainage where all standing water dissipates within forty-eight (48) hours after precipitation ends.
3. Material Compatibility:
a. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane Roofing Membrane Manufacturer based on testing and field experience.
4. Metal details, fabrication practices, and installation methods shall conform to applicable requirements of following:
a. Factory Mutual Loss Prevention Data Sheet 1-49, ‘Perimeter Flashing’ (latest issue).
b. Sheet Metal and Air Conditioning Contractors National Association Inc, 5th edition.

C. Components:
1. Membrane:
a. Adhered:
1) Meet requirements of ASTM D4434/D4434M, Type III.
2) Approved Products.
(a) Carlisle SynTec:
(1) Sure-Flex PVC FRS fiberglass reinforced membrane.
(b) Sika Sarnafil:
(1) G410 fiberglass reinforced membrane with lacquer coating.
b. Thickness:
1) Field membrane: Thickness: 80 mil (2.03 mm) by optimum width and length determined by job conditions.
2) Flashing membrane: Thickness: 0.60 mil (1.52 mm) by optimum width and length determined by job conditions.
c. Surface Color:
1) Gray.
2. Tapered Insulation:
a. FM and UL approved.
b. If required by Manufacturer for warranty, provide approved facer.
c. Polyisocyanurate Foam Insulation Board:
1) Meet requirements of ASTM C1289.
2) Insulation boards shall be Factory Mutual approved for classification selected for project.
3) Facer:
(a) Fiber reinforced paper facer or coated-glass fiber mat facer.
4) Insulation panels directly under roofing membrane and roof system cover board shall not exceed 48 inches by 96 inches (1 200 mm by 2 400 mm).
5) Insulation panels to be 2 inches (50 mm) maximum thickness for each layer. Insulation shall be multiple layers and achieve minimum 'R' value of 30. Tapered layer shall slope at 1/4 in per ft (20 mm per meter).
3. Roof System Cover Board (Recovery/Hard Board) Over Insulation:
a. Non-Fire Rated:
1) ‘Adhered' application:

(a) Minimum thickness to be determined by roofing system Manufacturer based upon Warranty term and Wind Warranty requirements.
(b) Approved Products:
(1) 1/2 inch (12.7 mm) thick minimum Dens-Deck Prime Roof Board by G-P Gypsum.
(2) 1/2 inch 1/2 inch (12.7 mm) thick minimum Securock by USG.

b. Fire Rating:
1) Fire Protection Board On Deck:
(a) Approved Products:
(1) 5/8 inch (16 mm) thick minimum Dens-Deck Fireguard Roof Board by G-P Gypsum.

4. Vapor Retarder / Air Barrier:
a. As required by manufacturer over 5/8” gypsum thermal barrier.
b. Wood Roof Decks:
1) Self adhered retarder: Apply self adhesive retarder directly over deck with overlaps and sheet edges sealed in accordance with Manufacturer’s instruction.

2.02 ACCESSORIES

A. Adhesives, Sealants and Sealer:
1. General:
a. Supplied by Roofing Membrane Manufacture Meet uplift and VOC requirements required for Project for specific application method and in compliance with all local codes and restrictions provided by Roofing Membrane Manufacture.
b. As accepted by Roofing Manufacturer under specified warranty.
2. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when required by local codes or AHJ.
3. Pourable Sealer:
a. Approved by Roofing Membrane Manufacturer for specified roof system.
4. Membrane:
a. Category Four Approved Products. See Section 01 6200 for definitions of Categories:
b. Carlisle SynTec:
1) Carlisle Sure Flex Low VOC membrane adhesive.
2) Carlisle Sure Flex Hydro Bond water based membrane adhesive.
c. Sika Sarnafil:
1) Sarnacol 2170 VC: VOC acceptable membrane adhesive.
2) Sarnacol 2121: Water based membrane adhesive.
3) Sarnacol DS-100: VOC acceptable membrane adhesive.

B. Coated Metal:
1. Colors:
a. Not Seen From Ground: Color to match selected roof membrane.
b. Seen From Ground: Manufacturer’s standard color as selected by Architect to match membrane surface color chosen for project.
1) Edge metal color to be selected during submittal reviews.
c. Approved Products:
1) Carlisle SynTec:
(a) Sure Flex coated metal 24 ga (0.6 mm) G90 galvanized sheet metal laminated with 0.035 inch (0.9 mm) thick PVC membrane:
(b) Membrane cover strips:
(1) 0.060 inch (1.5 mm) thick.
(2) Color to match selected Sure Flex.
2) Sika Sarnafil:

(a) 25 ga (0.56 mm) G90 galvanized sheet metal laminated with 0.020 inch (0.55 mm) thick membrane:
(b) Sarnclad membrane cover strips:
(1) 0.060 inch (1.5 mm) thick.
(2) Color to match selected Sarnaclad.

C. Counterflashing:
1. Formed to meet design requirements and match existing metals and aesthetics, furnished by Membrane Manufacturer.

D. Mechanical Attachment Accessories:
1. Fasteners:
a. Approved Products:
1) Carlisle SynTec:
(a) Carlisle Fasteners or engineered fasteners designed to anchor membrane and flashing into substrates that include steel, concrete, gypsum, and light weight concrete roof decks.
2) Sika Sarnafil:
(a) Sarnafasteners or engineered fasteners designed to anchor membrane and flashing into substrates that include steel, concrete, gypsum, and light weight concrete roof decks.
2. Bars And Plates:
a. Approved Products:
1) Carlisle SynTec:
(a) Bars and plates engineered as companion assembly with Carlisle Fasteners. Used to secure membrane and/or flashing as required by Membrane Manufacturer.
2) Sika Sarnafil:
(a) Bars and plates engineered as companion assembly with Sarnafasteners. Used to secure membrane and/or flashing as required by Membrane Manufacturer.

E. Miscellaneous Fasteners and Anchors:
1. Fasteners, anchors, nails, straps, bars, etc. shall be of post-galvanized zinc or cadmium-plated steel, aluminum, or stainless steel. Mixing metal types and methods of contact shall be in such manner as to avoid galvanic corrosion.
2. Compatible with substrates and flashings to be anchored:
a. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins.
b. Concrete fasteners and anchors shall have minimum embedment of 1-1/4 inch (32 mm) and shall be approved for such use by Fastener Manufacturer.
c. Wood fasteners and anchors shall have embedment of one inch (25 mm) minimum and be approved for such use by Fastener Manufacturer.

F. Prefabricated Flashing Accessories: Membrane corners and pipe stacks as supplied by Membrane manufacturer.

G. Traffic Surface:
1. Walkway Rolls:
a. Description:
1) Traffic surface used to protect roof membrane with limited slip surface.
2) Loose laid walk roll.
3) Warranted for 90 mph (145 kph).
b. Approved Products:
1) Carlisle SynTec:
(a) Manufacturer's Walkway Roll:
(1) Roof slope above 1 in 12 roof pitch.

(b) Sika Sarnafil:
(1) Sarnatred textured walkway traffic surface:
(2) Roof slope above 1 in 12 roof pitch.

H. Wood Nailers:
1. Treat wood nailers as per Section 06 0573.13 for preservative wood treatment and Section 06 0573.33 for fire-retardant wood treatment. Creosote or asphaltic-treated wood is not acceptable.
2. Wood nailers shall conform to Factory Mutual's Loss Prevention Data Sheet 1-49.
3. Wood shall have maximum moisture content of 19 percent by weight on dry weight basis.

PART 3 EXECUTION

3.01 APPROVED INSTALLERS

A. Approved Manufacturer's Roofing Installers:
1. Carlisle SynTec:
a. All Weather Waterproofing, John Moon, (801) 633-7509, jmoon@allweatherwaterproofing.com
b. American Roofing, James Yorgason (801) 618-6250, james@amcoroof.com
c. Fortress Roofing, Adam Cordon, (801) 509-8625, adam@fortressroofingutah.com
d. Heritage Roofing, Jim Smith, (801) 910-3712, jim@heritageroofinglc.com
e. Island Heights Construction, Hyde Park UT, Casey Ringer, (435) 753-7403, ihccasey@gmail.com
f. JTS, Ogden UT, Casey, (801) 627-6450, jtsroofing@aol.com
g. Northface Roofing, Craig Peters, (801) 455-8492, craig@northfaceroof.com
h. Perkes Roofing, Mark Perkes, (801) 430-4483, mark@perkesroofing.com
i. VIP Roofing, Centerville, UT – Contact: Max Ker (801) 631-6182.
2. Sika Sarnafil:
a. All Weather Waterproofing, John Moon, (801) 633-7509, jmoon@allweatherwaterproofing.com
b. American Roofing Co., James Yorgason (801) 618-6250.
c. Clark's Quality Roofing, Jeremy Searle (801) 520-3714, jeremys@clarkroof.com
d. Heritage Roofing, Jim Smith, (801) 910-3712, jim@heritageroofinglc.com
e. Layton Roofing, Ray Greenwood, (801) 414-4671, rp@layton-roofing.com
f. Utah Tile & Roofing "UTR", J.C. Hill , jchill@utri.com
g. Redd Roofing, Kyle Redd, (801) 721-2900, kyle@reddroofing.com
h. Wood Exterior Solutions, Brent Wood, brent@woodis.com
3. Versico:
a. American Frontier Roofing, Greg Allen, (435) 279-5218, americanfrontiergreg@gmail.com
b. Great Western Roofing, Dallin Shupe, dallingwrroofing@gmail.com, (385) 626-3449
c. Layton Roofing, Ray Paul Greenwood, (801) 495-3434, rp@layton-roofing.com
d. Mountain Peak, Zane Rust, office@mtpeakroofing.com, (435) 787-4174
e. Rodac, Shawn Redd, (801) 540-1511, shawn@rodacroofing.com
f. Rooftek, Tyler Winkelkotter (385) 231-6149, tyler@rooftek.com
g. Weathertech Roofing, Barry Rudd, (801) 979-0461, weathertechllc@yahoo.com

3.02 EXAMINATION

A. Verification Of Conditions:
1. Examine substrate and conditions. Verify substrate is suitable for installation of roofing system membrane before starting work of this Section.
2. Inspect for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect quality of work.
3. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and nailers match thicknesses of insulation to be installed.

4. Notify Architect of unsuitable conditions in writing:
    a. Commencement of Work by installer is considered acceptance of substrate.
    b. Stop work immediately if any unusual or concealed condition is discovered and immediately notify Architect in writing, with letter copy to Roofing Manufacturer.
    c. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 PREPARATION

A. General Requirements:
1. Nailers:
    a. Install continuous treated wood nailers at perimeter of entire roof and around roof projections and penetrations as described on Project Drawings. Replace existing wood nailers shown to remain, if they contain rot or are otherwise damaged.
        1) Anchor nailers to resist minimum force of 300 lbs (136 kg) per lineal foot (300 mm) in any direction:
            (a) Provide 1/2 inch (13 mm) space between nailer lengths.
            (b) Individual nailer lengths shall not be less than 36 inches (900 mm) long.
            (c) Nailer fastener spacing shall be at 12 inches (300 mm) on center, or 16 inches (400 mm) if necessary, to match structural framing.
            (d) Stagger fasteners 1/3 nailer width and install within 6 inches (150 mm) of each end.
            (e) Meet requirements current Factory Mutual Loss Prevention Data Sheet 1-49.
        2) Thickness shall match substrate or insulation/hardboard height.
        3) Anchor existing woodwork that is to remain so as to resist minimum force of 300 lbs (136 kg) per lineal foot (300 mm) in any direction. Reuse only woodwork designated to be reused in detail drawings.
2. Prevent interior leakage, materials falling into interior, and other such Occurrences.
3. Install temporary roof membrane (Sarnavap SA as called out in Part 2 of this specification section) to prevent interior leakage and soiling/staining of new roof membrane. Temporary roofing can remain exposed for maximum of 90 days.
4. Install temporary water cut-offs at completion of each day's work and completely remove upon resumption of work.
    a. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with finished roof as installation progresses.
    b. Replace contaminated membrane at no additional cost to Owner.
5. Provide temporary walkways and work platforms as necessary to complete work under this section with no damage to existing surfaces, surfaces exposed during work, and to new materials applied.
6. Coordinate application of membrane to provide protection of underlying materials from wetting or other damage by the elements on a continuous basis.
7. Sheet metal sleeves, caps, and enclosures shall be completely installed on daily basis.

B. Surface Preparation:
1. Surfaces to receive new materials shall be clean, smooth, dry (free of moisture), free of flaws, sharp edges, loose and foreign material, dirt, oil and grease.
    a. Mechanically scrape exposed surfaces, if necessary, to remove projections.
    b. Roofing shall not start until defects have been corrected.
2. Verify that surfaces receiving new materials have no defects or errors which would result in poor application or cause latent defects in workmanship.
3. Inspect anchoring of wood members for conformance to specified requirements. Upgrade nonconforming fasteners to meet specified requirements.
4. Reset or replace fasteners that are loose, deformed, damaged, or corroded.
5. Fit joints of insulation tightly together.
6. Prevent interior leakage, materials falling into interior, and other such Occurrences.

7. Install temporary water cut-offs at completion of each day's work and completely remove upon resumption of work.
    a. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with finished roof as installation progresses.
    b. Replace contaminated membrane at no additional cost to Owner.
8. Provide temporary walkways and work platforms as necessary to complete work under this section with no damage to existing surfaces exposed during work, and to new materials applied.
9. Coordinate application of membrane to provide protection of underlying materials from wetting or other damage by the elements on a continuous basis.
10. Sheet metal sleeves, caps, and enclosures shall be completely installed on daily basis.
11. 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.
12. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast.
13. Remove and discard temporary seals before beginning work on adjoining roofing.

3.04 INSTALLATION

A. Interface With Other Work:
    1. Coordinate with Installers whose work penetrates roof deck or requires men and equipment to traverse roof deck.

B. General:
    1. Installation shall be in conformance with latest edition of manufacturer's specification except where Contract Documents are more restrictive.
    2. Roof surfaces shall be free of water, ice and snow. Surfaces to receive new insulation, membrane, or flashings shall be dry. Should surface moisture occur, provide equipment necessary to dry surface before application.
    3. Secure new and temporary construction, including equipment and accessories, so as to preclude wind blow-off and subsequent roof or equipment damage.
    4. Install only as much roofing as can be made weathertight each day, including flashing and detail work. Clean seams and heat-weld before leaving jobsite.
    5. Schedule and execute work without exposing interior building areas to effects of inclement weather. Protect existing building and its contents against all risks.
    6. Install uninterrupted waterstops at end of each day's work and completely remove before proceeding with next day's work:
        a. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with finished roof as installation progresses.
        b. Replace contaminated membrane at no additional cost to Owner.
    7. Avoid use of newly constructed roofing as walking surface or for equipment movement and storage:
        a. Where such access is required, provide necessary protection and barriers to segregate work area and to prevent damage to adjacent areas.
        b. Provide protection layer consisting of roof sheathing over insulation board and roofing membrane for new and existing roof areas which receive rooftop traffic during construction.
    8. Before and during application, remove dirt, debris, and dust from surfaces either by vacuuming, sweeping, blowing with compressed air, or similar methods.
    9. Report rooftop contamination that is anticipated or that is occurring to Roofing Manufacturer to determine corrective steps to be taken.

C. Insulation:
    1. Neatly cut insulation cut to fit around penetrations and projections.
    2. Install tapered insulation in accordance with insulation manufacturer's shop drawings.

3. Install tapered insulation around drains creating a drain sump.
4. Do not install more insulation board than can be covered with roofing membrane by end of day's work or onset of inclement weather.
5. ‘Mechanically Attached’ Attachment:
    a. Fasten to deck with approved fasteners and plates in accordance with Insulation Manufacturer, Factory Mutual, and Roofing Manufacturer recommendations for fastening rates and patterns.
    b. Quantity and locations of fasteners and plates shall also result in insulation boards resting evenly on roof deck/substrate so there are no large cavities or air spaces between boards and substrate.
    c. Install fasteners in accordance with fastener manufacturer's recommendations:
        1) Fasteners are to have minimum penetration into structural deck as recommended by Fastener Manufacturer and Roofing Manufacturer.

D. Roof System Cover Board / Fire Guard Board:
1. Install 5/8” cover board as required by manufacturer for wind speed and warranty requirements and thermal barrier.
2. Offset roof system cover board joints 24 inches (600 mm) minimum from joints in underlying substrate or insulation.
3. Wood Roof Decks:
    a. Non-visible installation:
        1) Secure roof system cover board using insulation plates and fasteners spaced as required by Membrane Manufacturer’s warranty requirements.
    b. Visible (from ground/surrounding buildings) installation.
        1) Secure roof system cover board using low profile attachment plates and fasteners spaced as required by Membrane Manufacturer’s warranty requirements.
    c. Verify and install number and spacing of fasteners (attachment rate) as required by manufacturer’s performance and warranty requirements.

E. Membrane:
1. Inspection:
    a. Inspect surface of insulation or substrate before installation of roof membrane.
    b. Substrate shall be clean, dry and smooth with no excessive surface roughness, contaminated surfaces or unsound surfaces such as broken, delaminated, or damaged insulation boards.
    c. All sharp projections shall be removed by sweeping, blowing or vacuum cleaning.
2. Adhesive:
    a. Follow ambient conditions as specified in Part 1 of this specification.
    b. Follow Manufacturer's written application instructions including adhesive coverage rate requirements. Apply no adhesive in seam areas.
        1) Installer Option A):
            (a) Apply adhesive using solvent-resistant nap paint rollers.
        2) Installer Option B):
            (a) Apply adhesive using wet lay-in adhesive application.
3. Hot-Air Welding Of Lap Areas:
    a. General:
        1) Seams shall be hot air welded. Seam overlaps shall be 3 inches (75 mm) wide minimum when automatic machine welding, and 4 inches (100 mm) wide when hand welding.
        2) Membrane to be welded shall be clean and dry. No adhesive shall be in seam.
        3) Hand Welding:
            (a) Hand welded seams shall be completed in three stages. Allow hot-air welding equipment to warm up for one (1) minute minimum before welding.

4) Seam shall be tack-welded every 36 inches (900 mm) to hold membrane in place.
5) Weld back edge of seam with narrow but continuous weld to prevent loss of hot air during final welding.
6) Insert nozzle into seam at 45 degree angle. Once proper welding temperature has been reached and membrane begins to 'flow', position hand roller perpendicular to nozzle and press lightly. For straight seams, use 1-1/2 inch (38 mm) wide nozzle. Use 3/4 inch (19 mm) wide nozzle for corners and compound connections.

b. Machine Welding: Follow Roofing Manufacturer's instructions and use recommended equipment.
c. Quality Control of Welded Seams:
1) Check welded seams for continuity using rounded screwdriver. Make on-site evaluation of welded seams daily at locations directed by Owner's Representative or representative of Roofing Manufacturer.
2) Take one inch (25 mm) wide cross-section samples of welded seams at least three times a day. Patch each test cut at no additional cost to Owner.

F. Flashings:
1. General:
a. Install flashings concurrently with roof membrane. No temporary flashings will be allowed without prior written approval of Owner's Representative and Roofing Manufacturer. Approval shall only be for specific locations on specific dates.
b. If water is allowed to enter under newly completed roofing, remove and replace affected area no additional cost to Owner.
c. Adhere flashings to compatible, dry, smooth, and solvent-resistant surfaces.
2. Membrane Flashings:
a. Adhesive Application for Flashings:
1) Adhere flashing membranes to solvent resistant substrates. Cut interior and exterior corners and miters and hot-air weld into place. No bitumen shall be in contact with membrane.
2) Apply adhesive using solvent-resistant 3/4 inch (19 mm) nap paint rollers. Apply adhesive in smooth, even coatings with no holidays, globs, or similar irregularities. Coat only area that can be completely covered in same day's operations. Allow surface with adhesive coating to dry completely prior to installing flashing membrane.
3) When surface is dry, cut flashing membrane to workable length and evenly coat underside with adhesive apply at Manufacturer's adhesive coverage rate requirements.
4) When adhesive has dried sufficiently to produce strings when touched with a dry finger, roll coated membrane onto previously coated substrate being careful to avoid wrinkles. Do not allow adhesive on underside of membrane to completely dry. Overlap adjacent sheets 3 inches (75 mm). Flashings shall extend 4 inches (100 mm) onto roofing membrane. Press bonded sheet firmly in place with hand roller.
5) Apply no adhesive in seam areas that are to be welded.
b. Install fasteners and membrane fastenings plates at 12 inches (300 mm) on center with acceptable fasteners into structural deck at the base of parapets, walls, and curbs. Also install Sarnastop at the base of tapered edge strips and at transitions, peaks, and valleys according to Roofing Manufacturer's details:
1) Hurricane Bar:
(a) Provide inside 4 ft (1.20 m) perimeter peel stop (Hurricane Bar) required by Owner for all projects in all wind speed coverage areas.
c. Extend flashings 8 inches (200 mm) minimum above roofing level unless otherwise accepted in writing by Owner's representative and Roofing Manufacturer.

d. Terminate flashings according to Roofing Manufacturer's recommended details.
e. Adhere flashing membranes to solvent resistant substrates. Cut interior and exterior corners and miters and hot-air weld into place. No bitumen shall be in contact with membrane.

3. Metal Flashings:
   a. Complete metal work in conjunction with roofing and flashings so that watertight condition exists daily.
   b. Install metal to provide adequate resistance to bending and allow for normal thermal expansion and contraction.
   c. Metal joints shall be watertight.
   d. Securely fasten metal flashings into solid wood blocking. Fasteners shall penetrate wood nailer one inch (25 mm) minimum.
   e. Airtight and continuous metal hook strips are required behind metal fascias. Fasten hook strips 12 inches (300 mm) on center into wood nailer or masonry wall.
   f. Counterflashings shall overlap base flashings 4 inches (100 mm) minimum.
   g. Metal Base Flashings:
      1) Space adjacent sheets 1/4 inch (6 mm) apart.
      2) Fasten ends of metal 6 inches (150 mm) on center.
      3) Cover joint with 2 inch (50 mm) wide aluminum tape.
      4) Hot-air weld 4 inch (100 mm) wide strip of flashing membrane over joint.
   h. Metal Edge Flashing:
      1) Install as per requirements of ANSI/SPRI/FM 4435/ES-1, 'Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems'.
      2) Fasten metal edge flashings with two rows of post-galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered.
      3) Space adjacent sheets of metal 1/4 inch (6 mm) apart.
      4) Cover joint with 2 inch (50 mm) wide aluminum tape.
      5) Carlisle Sure Flex PVC coated metal:
         (a) Hot air weld 6 inch (150 mm) wide strip of non - reinforced PVC flashing over coated metal joint.
      6) Sika Sarnafil Sarnaclad:
         (a) Hot-air weld 4 inch (100 mm) wide strip of flashing membrane over joint.

G. Temporary Cut-Off:
1. Construct temporary waterstops to provide one hundred (100) percent watertight seal:
   a. Make stagger of insulation joints even by installing partial panels of insulation.
   b. Carry new membrane into waterstop.
   c. Seal waterstop to deck or substrate so water will not travel under new or existing roofing.
   d. Seal edge of membrane in continuous heavy application of sealant as described above.
   e. When work resumes, cut-out contaminated membrane and dispose of off-site.
2. If inclement weather occurs while temporary waterstop is in place, provide labor necessary to monitor situation to maintain watertight condition.
3. If water is allowed to enter under newly completed roofing, remove affected area and replace at no additional cost to Owner.

H. Walkway Rolls:
1. Cross Grip:
   a. Trim walkway to lay on roof surface where identified on Drawings.
   b. Use Cross Grip clips to secure sections together. Use Cross Grip ramps where identified by Architect.
   c. Roof slope above 1 in 12 roof pitch:
      1) Provide Manufacturers attachment recommendations.

3.05 FIELD QUALITY CONTROL

A. Field Inspection:
   1. Before Manufacturer's inspection for warranty, Installer must perform pre-inspection to review work and to verify flashing has been completed as well as application of caulking.
   2. Final Roof Inspection:
      a. Arrange for Roofing Membrane Manufacturer's technical personnel to inspect roofing installation on completion.
   3. Upon completion of roof inspection, provide certification that installation has been performed in accordance with Contract Document and Roofing Manufacturer requirements.

B. Non-Conforming Work:
   1. Correct all work not in compliance to Contract Documents at no additional cost to Owner.
      a. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
      b. Replace contaminated membrane.
   2. Additional inspections will be performed to determine compliance of replaced or additional work with specified requirements at no additional cost to Owner.
   3. Repair landscaped areas damaged by construction activities at no additional cost to Owner.

3.06 CLEANING

A. Waste Management:
   1. Perform daily clean-up to collect wrappings, empty container, paper, and other roofing waste debris from project site.
   2. Upon completion, roofing waste materials must be disposed from site to dumping area legally authorized to receive such materials.
   3. Complete site cleanup, including both interior and exterior building areas that have been affected by construction, to Owner's satisfaction.

3.07 PROTECTION

A. General Contractor Responsibility:
   1. Protection of roofing membrane from damage and wear from other trades from damage after completion of roof membrane.
   2. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by Manufacturer of affected construction.

END OF SECTION 07 5419

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, fascia, metal soffit, exterior penetrations, curb skirt flashings, crickets, scuppers, and other items indicated in Contract Drawings.

B. Sealants for joints within sheet metal fabrications.

1.02 DEFINITIONS

A. Base Flashing: That portion of flashing attached to or resting on roof deck to direct flow of water onto the roof covering.

B. Cap Flashing: Material used to cover top edge of base flashings or other flashings to prevent water seepage behind base flashing. Cap flashing overlaps base flashing.

C. Collar: Pre-formed flange placed over vent pipe to seal roof around vent pipe opening. Also called vent sleeve.

D. Drip Edge: Non-corrosive, non-staining material used along eaves and rakes to allow water runoff to drip clear of underlying building.

E. Flange: Metal pan extending up and down roof slope around flashing pieces. Usually at plumbing vents.

F. Flashing: Components used to prevent seepage of water into a building around any intersection or projection in a roof such as vent pipes, adjoining walls, and valleys.

G. Metal Flashing: Roof components made from sheet metal that are used to terminate roofing membrane or other material alongside roof perimeters as well as at roof penetrations.

H. Penetration: Any object that pierces surface of roof.

I. Pipe Boot: Prefabricated flashing piece used to flash around circular pipe penetrations. Also known as a Roof Jack.

J. Roof Jack: Term used to describe a Pipe Boot or Flashing Collar.

K. Valley: Internal angle formed by intersection of two sloping roof planes to provide water runoff.

L. Vent: Any outlet for air that protrudes through roof deck such as pipe or stack. Any device installed on roof, gable or soffit for purpose of ventilating underside of roof deck.

M. Vent Sleeve: See collar.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2022.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.

C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2022.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

E. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free 2007 (Reapproved 2018).

1.04 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Galvanized Sheet Metal Flashing and Trim Manufacturers:
   1. Acceptable Manufacturers Of Metal:
      a. CMG - Coated Metals Group, Denver, CO www.cmgmetals.com.
      b. Drexel Metals, LLC, Ivyland, PA www.drexmet.com.
      c. Fabral, Lancaster, PA www.fabral.com.
      d. Firestone Metal Products, Anoka, MN www.unaclad.com.
      e. MBCI, Houston, TX www.mbci.com.
      f. Metal Sales Manufacturing Corp, Sellersburg, IN www.mtlsales.com.
      g. O'Neal Flat Rolled Metals (member of O'Neal Industries), Brighton, CO www.ofrmetals.com.
      h. Petersen Aluminum Corp, Elk Grove, IL www.pac-clad.com.
      i. Ryerson, Chicago, IL www.ryerson.com.

2.02 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24-gauge, 0.0239-inch thick base metal.
   1. 16 ga (1.262 mm) for metal protective cover.
   2. 22 ga (0.792 mm) for hold-down clips.
   3. 24 ga (0.635 mm) for all other.

B. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; shop pre-coated with PVDF coating.
   1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
   2. Color: As selected by Architect from manufacturer's standard colors.
   3. Thickness:
      a. 16 ga (1.262 mm) for metal protective cover.
      b. 22 ga (0.792 mm) for hold-down clips.
      c. 24 ga (0.635 mm) for all other.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

2.04 MATERIALS

A. Aluminum Fascia:
   1. Materials:
      a. Aluminum: 0.032 inch thick minimum complete with accessories recommended by Manufacturer for proper installation.
   2. Finishes:
      a. Face coating Polyvinylidene Fluoride (PVF2) Resin-base finish (Kynar 500 or Hylar 5000) for coil coating components containing 70 percent minimum PVF2 in resin portion of formula. Thermocured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
      b. Color as selected by Architect from Manufacturer's standard colors.
   3. Fabrication: Fascia may either be shop-fabricated using metal from a specified manufacturer, or a factory-fabricated standard system from a specified manufacturer.

B. Perforated Metal Soffit Panels:
   1. Performance:
      a. Design Criteria:
         1) Flush panel design.
            (a) Panels shall be interlocked full length of panel.
            (b) Panel widths shall be Manufacturer’s standard.
         2) Performance Standard: ATAS Wind-LOK Soffit MPS120.
         3) Perforation as required option where indicated on contract drawings, incl;uding style and extent of perforation. Perforated full width of panel with holes designed so one dimension does not exceed 1/8 inch.
   2. Materials:
      a. 0.032 inch thick minimum 3105-H24 alloy aluminum meeting requirements of ASTM B209.
   3. Fabrication:
      a. Panels shall be uniformly dimensioned, roll formed to lengths to avoid trimming.
      b. Panel system shall be anchored as recommended by Manufacturer.
      c. Panels shall be continuous.
   4. Finish:
      a. Polyvinylidene Fluoride (PVF2) Resin-base (Kynar 500 or Hylar 5000) finish for coil coating components containing 70 percent minimum PVF2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
   5. Color as selected by Architect from Manufacturer's standard colors.
   6. Accessories:
      a. Continuous Soffit Vent (where shown on contract drawings)
      b. Acceptable Products:
         1) Aluminum 8.8 sq in net free ventilation per lineal foot. Width: 2 inches. Color: white or brown.
            (a) Mastic VAS70 Vent-A-Strip (Model 70) by Mastic Home Exteriors by Ply Gem Chicago, IL www.mastic.com/.
         2) Aluminum 9.9 sq in net free ventilation per lineal foot. Width: 2-1/4 inches. Color: white or brown.
            (a) Mastic VAS79 Vent-A-Strip (Model 79) by Mastic Home Exteriors by Ply Gem Chicago, IL www.mastic.com/.

C. Installation:
   1. Conceal fasteners where possible. Paint heads of exposed fasteners to match background.
   2. Isolate from dissimilar metals to prevent electrolytic action.

D. Gutters and Downspouts:
   1. Materials
      a. Steel:
         1) Downspouts: Rectangular, 26 ga (0.0217 inches - 0.5512 mm) galvanized steel including necessary elbows.
         2) Gutters: 24 ga (0.0276 inches - 0.7010 mm) galvanized steel.
         3) Brackets: 22 ga (0.0336 inches - 0.8534 mm) galvanized steel or 26 ga (0.0217 inches - 0.478 mm) double-hemmed minimum.
      b. Aluminum:
         1) Downspouts: Rectangular 0.032 inch (0.813 mm) minimum aluminum including necessary elbows.
         2) Gutters: 0.04 inch (1.0 mm) minimum aluminum.
         3) Brackets: 0.06 inch (1.52 mm) minimum aluminum.
      c. Screws, Bolts, Nails, And Accessory Fasteners: Non-corrosive and of strength and type consistent with function.

d. Downspouts, gutters, brackets, fasteners, and accessories shall be compatible material.

2. Fabrication:
   a. Fabricate in accordance with SMACNA Architectural Manual recommendations, where applicable.
   b. Cross-sectional configuration of gutter shall be Style A, (Page 1.13 6th Edition) of SMACNA Architectural Manual.
   c. Form accurately to details.
   d. Profiles, bends, and intersections shall be even and true to line.
3. Finishes:
   a. Metal exposed to view shall have face coating of Polyvinylidene Fluoride (PVF2) Resin-base finish (Kynar 500 or Hylar 5000) containing seventy (70) percent minimum PVF2 in resin portion of formula.
      1) Thermo-cured two (2) coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
      2) Reverse side coating shall be thermo-cured system consisting of corrosion inhibiting epoxy primer applied over properly pre-treated metal.
   b. Color as selected by Architect from Manufacturer's standard colors.
4. Installation:
   a. Allow no more than 40 feet between downspouts. Lap joints in downspouts 1-1/2 inches minimum in direction of water flow.
   b. Furnish and install outlet tubes and gutter ends where required. Furnish and install expansion joints in runs exceeding 50 feet and in runs that are restrained at both ends. Lap other joints in gutter one inch minimum, apply sealant in lap, and stainless steel rivet one inch on center maximum.

E. Step Flashing:
1. Step flashing required for steep slope for roof to wall flashing.
   a. 24 ga pre-finished galvanized steel meeting requirements for sheet metal specified in materials above.
   b. Size: 5 inch x 5 inch by 8 inch or 12 inches length.

F. Asphalt Shingle Flashing:
1. Including Formed Valley Metal, Pipe flashing for vent piping and flues, Roof jacks, Saddles and curb flashings, Miscellaneous flashing.
2. Formed Valley Metal And Drip Edge:
   a. Material: Aluminum: 0.032 inch thick minimum or Steel: Minimum 24 ga, hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz/sq ft. or galvalume meeting requirements of ASTM A792/A792M AZ50, 50 ksi.
   b. Profile: Form accurately to details. Provide formed valley metal in 10 foot lengths with one inch 'V' crimp and break in center to match roof slopes. Profiles, bends, and intersections shall be even and true to line.

G. Galvanized Reglets:
1. Acceptable Products:
   a. Fry Springlock Reglets by Fry Reglet Corp, Alhambra, CA www.fryreglet.com.

H. Stainless Steel Reglets:
1. Acceptable Products:
   a. Fry Springlock Reglets by Fry Reglet Corp, Alhambra, CA www.fryreglet.com.

I. Roof Diverter:
1. Roof Diverter (Kickout Diverter) required when vertical wall extends beyond lower roof.
   a. 24 ga (0.635 mm) pre finished galvanized steel meeting requirements for sheet metal specified in materials above.
   b. Size: 6 inch x 6 inch by 12 inches length.

J. Roof Jacks For Metal Flues: Factory-made galvanized steel.

K. Pipe Flashing For Concentric Piping Flashing Retrofitting:
   1. Description:
      a. Black EPDM Pipe flashing for existing Concentric Piping for reroofing existing roofs (cutting Concentric Roof Termination cap off and replacing is not permitted).
      b. Weather resistance to withstand ultra violet light and ozone.
      c. Malleable base to conform to different roof pitches.
      d. Pipe size: 1/2 inch to 4 inch.
         1) On-site customization.
      e. Fasteners included.
   2. Acceptable Products:
      a. Aztec RF101BP.

L. Pipe Flashing For Plumbing Vent Lines metal flues, and HVAC Air Piping: Ultra-pure high consistency molded one hundred (100) percent silicone rubber pipe boot that prevents cracking and splitting for life of roof.

2.05 ACCESSORIES

A. Fasteners: Same material and finish as flashing metal, with soft neoprene washers of strength and type consistent with function.

B. Concealed Sealants: Non-curing butyl sealant.

C. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

D. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Install surface mounted reglets true to lines and levels, and seal top of reglets with sealant.

C. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

A. Install with small, watertight seams.

B. Slope to provide positive drainage.

C. Provide sufficient hold down clips to insure true alignment and security against wind.

D. Provide 4 inch (100 mm) minimum overlap.

E. Allow sufficient tolerance for expansion and contraction.

F. Insulate work to prevent electrolytic action.

G. Roof Diverter (Kickout Diverter):
   1. Extend roof diverter 1 inch (25 mm) minimum beyond face edge of lower roof.
   2. Extend underlayment vertically up wall behind flashing.
   3. Solder all joints.
   4. Apply sealant.

3.04 CLEANING

A. Leave metals clean and free of defects, stains, and damaged finish.

END OF SECTION

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SECTION 07 7100
ROOF SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufactured roof specialties, including vents.

1.02 REFERENCE STANDARDS

A. 29 CFR 1910, Subpart D - Walking-Working Surfaces, 1910.21-1910.30; current edition.

B. 29 CFR 1910.23 - Ladders; Current Edition.

C. 29 CFR 1910.27 - Scaffolds and Rope Descent Systems; Current Edition.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

E. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2022.

F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

G. FBC TAS 201 - Impact Test Procedures; Testing Application Standard; 1994.

H. ICC (IBC)-2018 - International Building Code; 2021.

I. NRCA (RM) - The NRCA Roofing Manual; 2019.

1.03 SUBMITTALS

A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.

C. Manufacturer Instructions:
   1. Design details.
   2. Published ridge vent installation instructions.
   3. Storage and handling requirements.

D. Certificates:
   1. Manufacturer's Certificates of compliance showing products meet or exceed specified requirements.

E. Tests And Evaluation Reports:
   1. Manufacturer's test reports.
   2. Wind speed coverage for warranted wind speed.
   3. Florida Certificate of Product Approval.
   4. Notice of Acceptance (NOA).

F. Samples:
   1. 2 inch (50 mm) long samples of each profile required.

G. Special Procedure Submittals:
   1. Contact Owner’s Representative (FM Group or Project Manager) for following information:
      a. Installer to include following mandatory information for Warranty Information to be given to Ridge Vent Manufacturer to be added to Manufacturer Warranty included with Closing Submittals:
         1) Name of Owner (name of FM Group) _____
         2) Mailing Address (FM office address) _____
         3) Property ID _____

4) Site address:
_____
5) Installation of Ridge Vent (or Roof Completion) Date _____
6) Any addition data required from Ridge Vent Manufacturer.

H. Closeout Submittals:
1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
a. Warranty Documentation:
1) Final, executed copy of Warranty including Installer project information.

1.04 QUALITY ASSURANCE

A. Regulatory Agency Sustainability Approvals:
1. Ridge Vent System:
a. High Velocity Hurricane Zone (HVHZ):
1) Florida Building Code (FBC):
(a) Comply with 1626.1, HVHZ – Impact Test for Wind-Bourn Debris' (2010 Code).
2) Meet Florida Building Code Test Protocol TAS 100(A)-95, 'Test Procedure For Wind And Wind Driven Rain Resistance Of Discontinuous Roof Systems'.
3) Meet Florida Building Code Test Protocol TAS 105-98, 'Test Procedure For Field Withdrawal Resistance Testing.
(a) Miami-Dade County, Florida:
(b) NOA No. 12-1218.13 (expires: 07/11/18).
4) Florida Certificate of Product:
(a) Florida Certificate of Product Approval FL11143.2-R2 (expires 12/31/2024).
b. High Velocity Hurricane Zone – Texas
1) Texas Department of Insurance
(a) Comply with ASTM E330
2. Wind Speed:
a. As required to meet local codes having jurisdiction.

B. Qualifications:
1. Manufacturer:
a. Company specializing in manufacturing products specified with this section with at least five (5) years experience and no known failures of specified product manufactured.

C. Pre-Installation Conference:
1. Participate in pre-installation conference held jointly with Section 07 3113.
2. In addition to agenda items specified in Section 01 3000, review following:
a. Review if Project is in high wind area.
b. Review Ridge Vent Manufacturers ventilation cutout requirements on roof deck and location of ventilation cutouts shown on Contract Documents.

D. Sequencing:
1. Coordinate installation with roof membrane.
2. Installation of ridge vent system.
3. Installation of conductor cable, air terminal base, and air terminal attached to 'Lightning Rod Cover Plate' by Section 26 4100.

1.05 WARRANTY

A. Manufacturer Warranty:
1. Standard Manufacturer's Warranty for soffit vents.
2. General:
a. Ridge vent system will provide calculated net free area (NFA) stated design.
b. Warranty starts at completion of installation.

c. Warranty covers replacement cost excluding labor and any costs involved with repairing or replacing other roofing or building materials.
d. Meet Hurricane-Prone Regions and Wind-Borne region requirements if required by local building code officials.
e. Meet High Velocity Hurricane Zone (HVHZ) requirements if required by local building code officials.

3. Manufacturer's thirty (30) year warranty covering:
   a. Kynar 500 paint and finish warranty covering color fade, chalk, and film integrity for ridge vent system.
4. Manufacturer's twenty (20) year warranty covering:
   a. Ridge vent system to be free from defects that will affect its performance.
   b. Ridge vent system will withstand winds up to 120 mph (193 kph) average wind speed.
   c. Ridge vent system will withstand snow load.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Ridge Vents:
   1. Manufacturers:
      a. Manufacturers And Products. See Section 01 6000:
         1) Metal-Era Airflow Solutions, Waukesha, WI www.metalera.com.
            (a) Contact Information: Kevin Brown (800) 558-2162, 262-436-6258, thechurch@metalera.com, kevin.brown@metalera.com
         2) Western Metal Products, LC, Woods Cross, UT www.westernmetalproducts.com.
            (a) Contact Information: James Rohletter, phone (888) 298-3454, email rvbid@westernmetalproducts.com
         3) Morris Architectural Metals, Temple, GA www.morrisam.com
            (a) Contact Information: William Morris (678)-631-7130, 404-480-0353, email: william.morris@morrisam.com

B. Soffit Vents:
   1. Manufacturers:
      a. Cor-A-Vent, Inc, Mishawaka, IN www.cor-a-vent.com

C. Low Profile Relief Vents:
   1. Manufacturers:
      a. GAF Materials Corp., Wayne, NJ www.gaf.com.
      b. Equal as approved by Architect prior to installation.

2.02 COMPONENTS

A. Engineered Roof Ventilation:
   1. Ridge Vent System: Factory fabricated, formed panels with integral attachment flanges and snap-on cover.
      a. Ridge Vent:
         1) Basis of Design:
            (a) Basis of Design Approved Product:
               (1) LDS HI-PERF High Velocity Ridge Vent by Metal-Era.
            (b) Basis of Design Approved Equivalent Product:
               (1) Ridge Vent by Western Metal.
               (2) Ridge Vent by Morris Architectural Metals
         2) Design Criteria:
            (a) Not approved on roof mean heights greater than 33 feet (10 m).
            (b) Weather-proof and bug-proof ventilation system.
            (c) Withstand winds up to 120 mph (193 kph) average wind speed.

(d) Provide net free area (NFA) requirements as determined by vented roof deck system and eave condition as indicated on Contract Drawings.
(e) Meet High Velocity Hurricane Zone (HVHZ) TAS 100(A)-95) test protocol for water infiltration.
(1) Model: ASRP1 by Western Metal.
(2) Model: VSW Headwall by Morris Architectural Metals

3) Slope to Slope Version:
(a) Approved Products.
(1) Model HPSS by Metal-Era.
(2) Model: ASRP2 by Western Metal.
(3) Model: VSS Ridge by Morris Architectural Metals

4) Net free area (NFA):
(a) Net free area: To be calculated by Ridge Vent Manufacturer for project.
(b) Refer to contract drawings for required NFA calculations for ridge vents.

b. Components:
1) Approved Product:
(a) Basis of design for System Components for this Project is Metal-Era Ridge Vent.
(b) Basis of design approved equivalent system components for this Project is Western Metal or Morris Architectural Metals.

2) Ridge vent system comprising of following:
(a) Cover plate 8 inch wide at each joint over ridge vent cover.
(b) Continuous deflector with baffle.
(c) Continuous Z bracket with intermittent spacer at 12 inch on center to supporting ridge cover.
(d) End cap / cover plate.
(e) Expanded metal support screen.
(f) Fasteners.
(g) Intermittent spacers at 12 inch on center directly under ridge vent cover.
(h) Ridge vent cover in 12 feet length.

3) Metal:
(a) 24 ga (0.0276 in) minimum hot-dipped galvanized to meet requirements of ASTM A653/A653M, 1.25 oz per sq ft or galvalume meeting requirements of ASTM A792/A792M AZ50.
(b) Aluminum: 0.040 inch, 0.050, 0.063 inch.

4) Expanded metal support screen:
(a) 0.050 inch 3003-H14 formed aluminum with minimum of 48 percent open area.

5) Z brackets: 20 gauge (0.0396 in) G90 galvanized steel.
6) Deflector: 24 ga (0.0276 in) minimum.

c. Finish: Manufacturer's standard polyvinylidene fluoride (PVDF) coating. Polyvinylidene Fluoride (PV_2) Resin-base finish (Kynar 500) for coil coating components containing seventy (70) percent minimum PVF_2 in resin portion of formula. Thermo-cured two coat system consisting of corrosion inhibiting epoxy primer and top coat factory applied over properly pre-treated metal.
d. Finish Color: Medium Bronze.

B. Soffit Vents:
1. Design Criteria:
a. General: Manufactured of corrosion-free, extruded, high-density polypropylene
b. Net free area (NFA):
1) Net free area: 10 sq in per lineal foot
c. Dimensions: 1 inch wide by 48 inches long by 1 1/2 inch high.
d. Color: Black / Dark Brown.

2. Approved Products:
   a. Cor-A-Vent S-400 Strip Vent

C. Low Profile Relief Vents:
1. Design Criteria
   a. Internal insect screen
   b. Powder Coated Finish: Brown Aluminum Color.
   c. 60 square inches NFA per vent
   d. For roof pitches 3:12 and steeper
2. Approved Products:
   a. MasterFlow Roof Louver SSB960AWF by GAF Materials Corp.

2.03 ACCESSORIES

A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

B. General Sealant: Weathersealing expansion, contraction, perimeter, and other movement joint sealant.
1. Design Criteria:
   a. As specified in Section 07 9200 - Joint Sealants.
   b. Meet following standards for Sealant:
      1) ASTM C920: Type S Grade NS, Class 25 (min) Use O.
      2) 100 percent silicone.
2. Approved Products. See Section 01 6000:
   a. Dow Corning: 790 Silicone Building Sealant.
   b. Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
   c. Tremco: Tremsil 600 Silicone Sealant.

C. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

D. Insulation Board Adhesive: Two-component, low-rise polyurethane foam adhesive used for adhering insulation to low slope roof deck materials.

E. Ridge Vent System:
1. End Caps, Cover Plates, and other accessories necessary for proper installation.

F. Fasteners:
1. Ridge vent fastened to structure:
   a. Approved Fasteners:
      1) Basis of design: Metal-Era Ridge Vent.
      2) Basis of design approved equivalent: Western Metal or Morris Architectural Metals
   b. Fasteners shall be approved by Ridge Vent Manufacturer and provide minimum pull out resistance of 240 lbf (109 kg) into substrate when tested in accordance with TAS 105 test protocol.
      1) Screws:
         (a) #9 1-1/2 inches (38 mm) stainless steel screws.
         (b) Provided by Manufacturer.
      2) New Building:
         (a) #9 1-1/2 inches (38 mm) stainless steel screws.
         (b) Provided by Manufacturer.
         (c) Nailing permitted as per manufacturer’s instructions.

G. Lightning Rod Cover Plate:
1. 'Lightning Rod Cover Plate' provided by Ridge Vent Manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.
   1. Verify Ridge Vent Manufacturers ventilation cutout requirements on roof deck and location of ventilation cutouts shown on Contract Documents to verify correct location for all cutouts.
      a. Make adjustments to ventilation cutouts if necessary before installation of ridge vent.
   2. Examine deck to determine if it is satisfactory for installation of ridge vent system.
      a. Conditions include, but are not limited to, moisture on deck and protruding deck fasteners.
      b. Verify substrate is dry, clean and free of foreign matter.
   3. Do not begin installation until substrates have been properly prepared.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Seal joints within components when required by component manufacturer.

C. Anchor components securely.

D. Ridge Vent:
   1. Clean roof sheathing, including removal of dirt, shingle nails, and debris, before installation of ridge vent system.
   2. Install in accordance with IBC Section 1503.2 'Flashing'.
   3. Install in accordance and as shown with Manufacturer's installation instructions for assembly of components and attachment to roof deck:
   4. Use provided fasteners consistent with manufacturer's instructions, suitable for substrate to which it is being installed.
   5. Attach to roof/wall structure with stainless steel screws provided by Manufacturer at spacing required by Manufacturer. All nail heads and vent section joints shall be sealed with silicone sealant.
   6. Remove protective film before applying sealant.
   7. Apply sealants as per Manufacturer's installation instructions.

E. Lightning Rod Cover Plate:
   1. After installation of Ridge Vent:
      a. Coordinate installation of conductor cable, air terminal base, and air terminal attached to 'Lightning Rod Cover Plate' with Section 26 4113.

F. Soffit Vents:
   1. Clean roof sheathing, including removal of dirt, shingle nails, and debris, before installation of soffit vent system.
   2. Install soffit vents along entire length of soffits.
   3. Ensure that adequate blocking or barriers are installed to prevent insulation from impeding air flow.
   4. Flashings: Install specified flashings where indicated on the drawings.
      a. Install in accordance with IBC Section 1503.2 'Flashing'.
      b. Install in accordance and as shown with Manufacturer's installation instructions for assembly of components and attachment to framing:
      c. Use provided fasteners consistent with manufacturer's instructions, suitable for substrate to which it is being installed.
      d. Apply sealants as per Manufacturer's installation instructions.

3.03 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.04 CLEANING

A. General:
   1. Clean exposed surfaces per manufacturer's written instructions. Touch up damaged metal coatings.

B. Waste Management:
   1. Disposal:
      a. Remove debris resulting from work of this Section from roof and site in approved waste receptacle.

END OF SECTION 07 7100

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SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install sealants not specified to be furnished and installed under other Sections.
   2. Quality of sealants to be used on Project not specified elsewhere, including submittal, material, and installation requirements.

B. Related Requirements:
   1. Removing existing sealants specified in Sections where work required.
   2. Furnishing and installing of sealants is specified in Sections specifying work to receive new sealants.

1.02 REFERENCES

A. Reference Standards:
   1. ASTM International:
      a. ASTM C920-14a, ‘Standard Specification for Elastomeric Joint Sealants’.
      b. ASTM C1193-16, ‘Standard Guide for Use of Joint Sealants’.
      c. ASTM C1330-02(2013), ‘Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants’.
      d. ASTM C1481-12(2017) 'Standard Guide for Use of Joint Sealants with Exterior Insulation & Finish Systems (EIFS)'.
      e. ASTM D5893/D5893M-16, ‘Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements’.

1.03 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.

B. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

C. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

D. ASTM C1481 - Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS) 2012.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

F. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements 2009 (Reapproved 2016).

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

H. ASTM C834 - Standard Specification for Latex Sealants 2017.

I. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.

J. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Scheduling:
   1. Schedule work so waterproofing, water repellents and preservative finishes are installed after sealants, unless sealant manufacturer approves otherwise in writing.
   2. Ensure sealants are cured before covering with other materials.

1.05 SUBMITTALS

A. Action Submittals:
   1. Product Data:
      a. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
      b. Manufacturer's literature for each Product.
      c. Schedule showing joints requiring sealants. Show also backing and primer to be used.

B. Informational Submittals:
   1. Certificates:
      a. Manufacturer's Certificate:
         1) Certify products are suitable for intended use and products meet or exceed specified requirements.
         2) Certificate from Manufacturer indicating date of manufacture.
   2. Manufacturers' Instructions:
      a. Manufacturer's installation recommendations for each Product.
      b. Manufacturer's installation for completing sealant intersections when different materials are joined.
      c. Manufacturer's installation for removing existing sealants and preparing joints for new sealant.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten (10) years documented experience.
   2. Applicator Qualifications:
      a. Company specializing in performing work of this section.
      b. Provide if requested, reference of projects with minimum three (3) years documented experience, minimum three (3) successfully completed projects of similar scope and complexity, and approved by manufacturer.
      c. Designate one (1) individual as project foreman who shall be on site at all times during installation.

B. Preconstruction Testing:
   1. Pre-construction testing is not required when sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.

C. Mockups:
   1. Provide mockups including sealant and joint accessories to illustrate installation quality and color if requested by Architect or Project Manager.
      a. Incorporate accepted mockup as part of Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
   1. Deliver and keep in original containers until ready for use.
   2. Inspect for damage or deteriorated materials.

B. Storage and Handling Requirements:
   1. Handle, store, and apply materials in compliance with applicable regulations and material safety data sheets (MSDS).
   2. Handle to prevent inclusion of foreign matter, damage by water, or breakage.
   3. Store in a cool dry location, but never under 40 deg F (4 deg C) or subjected to sustained temperatures exceeding 80 deg F (27 deg C) or as per Manufacturer's written recommendations.
   4. Do not use sealants that have exceeded shelf life of product.

1.08 FIELD CONDITIONS

A. Ambient Conditions:
   1. Do not install sealant during inclement weather or when such conditions are expected. Allow wet surfaces to dry.
   2. Follow Manufacturer’s temperature recommendations for installing sealants.
   3. Ambient Conditions:
      a. Do not apply caulking at temperatures below 40 deg F (4 deg C).

1.09 WARRANTY

A. Manufacturer Warranty:
   1. Signed warranties against adhesive and cohesive failure of sealant and against infiltration of water and air through sealed joint for period of three (3) years from date of Substantial Completion.
      a. Manufacturer's standard warranty covering sealant materials.
      b. Applicator’s standard warranty covering workmanship.

PART 2 PRODUCTS

2.01 SYSTEMS

A. Manufacturers:
   1. Manufacturer Contact List:
      a. Dow Corning Corp., Midland, MI www.dowcorning.com.
      b. Franklin International, Inc. Columbus, OH www.titebond.com.
      c. GE Sealants & Adhesives (see Momentive Performance Materials Inc.).
      d. Laticrete International Inc., Bethany, CT www.laticrete.com.
      e. Momentive Performance Materials Inc. (formally GE Sealants & Adhesives), Huntersville, NC www.ge.com/silicones.
      f. Sherwin-Williams, Cleveland, OH www.sherwin-williams.com.
      g. Sika Corporation, Lyndhurst, NJ www.sikaconstruction.com or Sika Canada Inc, Pointe Claire, QC www.sika.ca.
      h. Tremco, Beachwood, OH www.tremcosealants.com or Tremco Ltd, Toronto, ON (800) 363-3213.

B. Materials:
   1. Design Criteria:
      a. Compliance: Meet or exceed requirements of these standards:
         1) ASTM C920: Elastomeric joint sealant performance standard.
         2) ASTM D5893/D5893M: Silicone Joint Sealant for Concrete Pavements.
      b. Comply with Manufacturer’s ambient condition requirements.
      c. Sealants must meet Manufacturer's shelf-life requirements.
      d. Sealants must adhere to and be compatible with specified substrates.
      e. Sealants shall be stable when exposed to UV, joint movements, and environment prevailing at project location.
      f. Primers (Concrete, stone, masonry, and other nonporous surfaces typically do not require a primer. Aluminum and other nonporous surfaces except glass require use of a primer. Installer Option to use Adhesion Test to determine if primer is required or use primer called out in related sections):
         1) Adhesion Test:
            (a) Apply silicone sealant to small area and perform adhesion test to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with Manufacturer’s instructions. See ‘Field Quality Control’ in Part 3 of this specification for Adhesive Test.
         2) If Primer required, shall not stain and shall be compatible with substrates.
         3) Allow primer to dry before applying sealant.
   2. Sealants At Exterior Building Elements:

a. Description:
    1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
        (a) Aluminum entrance perimeters and thresholds.
        (b) Columns.
        (c) Connections.
        (d) Curtainwalls.
        (e) Door frames.
        (f) EIFS to metal joints.
        (g) Joints and cracks around windows.
        (h) Louvers.
        (i) Masonry.
        (j) Parapet caps.
        (k) Wall penetrations.
        (l) Other joints necessary to seal off building from outside air and moisture.
b. Design Criteria:
    1) Meet following standards for Sealant:
        (a) ASTM C920: Type S, Grade NS, Class 50 Use NT, M, G, A.
    2) Limitations:
        (a) Do not use below-grade applications.
        (b) Do not use on surfaces that are continuously immersed or in contact with water.
        (c) Do not use on wet, damp, frozen or contaminated surfaces.
        (d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.
    3) Color:
        (a) Architect to select from Manufacturer's standard colors.
        (b) Match building elements instead of window (do not use white that shows dirt easily).
c. Approved Products. See Section 01 6000:
    1) Dow Corning:
        (a) Primer: 1200 Prime Coat.
        (b) Sealant: 791 Silicone Weatherproofing Sealant.
    2) Momentive Performance Materials (formerly, GE Sealants & Adhesives):
        (a) Primer: SS4044 Primer.
        (b) Sealant: GE SCS2000 SilPruf Silicone Sealant & Adhesive.
    3) Tremco:
        (a) Primer:
            (1) Metal surface: No. 20 primer.
            (2) Porous surfaces: No. 23 primer.
        (b) Sealant: Spectrum 1 Silicone Sealant.

3. Sealants At Exterior Sheet Metal And Miscellaneous:
a. Description:
    1) Weathersealing expansion, contraction, perimeter, and other movement joints which may include all or part of the following for project:
        (a) Flashings.
        (b) Gutters.
        (c) Penetrations in soffits and fascias.
        (d) Roof vents and flues.
        (e) Lightning protection components.
b. Design Criteria:
    1) Meet following standards for Sealant:
        (a) ASTM C920: Type S Grade NS, Class 25 (min) Use NT, M, G, A and O.

2) Limitations:
(a) Do not use below-grade applications.
(b) Do not use on surfaces that are continuously immersed or in contact with water.
(c) Do not use on wet, damp, frozen or contaminated surfaces.
(d) Do not use on building materials that bleed oils, plasticizers or solvents, green or partially vulcanized rubber gaskets or tapes.

c. Approved Products. See Section 01 6000:
1) Dow Corning: 790 Silicone Building Sealant.
2) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2350 Silicone Elastomeric Sealant.
3) Tremco: Tremsil 600 Silicone Sealant.

4. General Interior Sealants:
a. General:
1) Inside jambs and heads of exterior door frames.
2) Both sides of interior door frames.
3) Inside perimeters of windows.
4) Miscellaneous gaps between substrates.

b. Design Criteria:
1) Meet ASTM C920, Type S, Grade NS, NT, and Class 25 test requirements.
2) 100 percent silicone sealant.

c. VOC Content of Interior Sealants:
1) Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
(a) Architectural Sealants: 250 g/L.
(b) Sealant Primers for Nonporous Substrates: 250 g/L.
(c) Sealant Primers for Porous Substrates: 775 g/L.

d. Non-Paintable Sealant (Installer Option A):
1) Approved Product. See Section 01 6000:
(a) Dow Corning: Tub, Tile, And Ceramic Silicone Sealant.
(b) Laticrete: Latasil Silicone Sealant.
(c) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS2800 SilGlaze II Silicone Sealant.
(d) Sherwin Williams: White Lightning Silicone Ultra Low Odor Window and Door Sealant.
(e) Tremco: Tremsil 200 Silicone Sealant.
(f) Franklin International: Titebond 2601 (White) 2611 (Clear) 100% Silicone Sealant.

e. Paintable Sealant (Installer Option B):
1) Approved Product. See Section 01 6000:
(a) Momentive Performance Materials (formerly, GE Sealants & Adhesives): GE SCS7000 Paintable Silicone Sealant.

2.02 ACCESSORIES

A. Bond Breaker Tape:
1. Pressure sensitive tape as by Sealant Manufacturer to suit application.
2. Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.

B. Joint Backing:
1. Comply with ASTM C1330.
2. Flexible closed cell, non-gassing polyurethane or polyolefin rod or bond breaker tape as recommended by Sealant Manufacturer for joints being sealed.

3. Oversized 25 to 50 percent larger than joint width.

C. Joint Cleaner:
1. Non-corrosive and non-staining type as recommended by Sealant Manufacturer, compatible with joint forming materials.

D. Masking Tape:
1. Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verification Of Conditions:
1. Examine substrate surfaces and joint openings are ready to receive Work.
a. Verify each sealant is compatible for use with joint substrates.
b. Verify joint surfaces are clean and dry.
c. Ensure concrete surfaces are fully cured.
2. Sealants provided shall meet Manufacturer's shelf-life requirements.
3. Notify Architect of unsuitable conditions in writing.
a. Do not proceed until unsatisfactory conditions are corrected.
4. Commencement of Work by installer is considered acceptance of substrate.

3.02 PREPARATION

A. Surface Preparation:
1. Surfaces shall be clean, dry, free of dust, oil, grease, dew, frost or incompatible sealers, paints or coatings that may interfere with adhesion. Prepare substrates in accordance with Manufacturer’s instructions:
a. Porous surfaces: Clean by mechanical methods to expose sound surface free of contamination and laitance followed by blasting with oil-free compressed air.
b. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193. Allow solvent to evaporate prior to sealant application.
c. High-pressure water cleaning: Exercise care that water does not enter through failed joints.
d. Primers:
1) Primers enhance adhesion ability.
2) Use of primers is not a substitution for poor joint preparation.
3) Primers should be used always in horizontal application where there is ponding water.
2. Field test joints in inconspicuous location.
a. Verify joint preparation and primer required to obtain optimum adhesion of sealants to joint substrate.
b. When test indicates sealant adhesion failure, modify joint preparation primer, or both and retest until joint passes sealant adhesion test.
3. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.

B. Joints:
1. Prepare joints in accordance with ASTM C1193.
a. Clean joint surfaces of contaminates capable of affecting sealant bond to joint surface using Manufacturer’s recommended instructions for joint preparation methods.
b. Remove dirt, dust, oils, wax, paints, and contamination capable of affecting primer and sealant bond.
c. Clean concrete joint surfaces to remove curing agents and form release agents.

C. Protection:
1. Protect elements surrounding the Work of this section from damage or disfiguration.

3.03 APPLICATION

A. General:
   1. Apply silicone sealant in accordance with Manufacturer's instructions.
   2. Do not use damaged or deteriorated materials.
   3. Install primer and sealants in accordance with ASTM C1193 and Manufacturer's instructions.
   4. Apply primer where required for sealant adhesion.
   5. Install sealants immediately after joint preparation.
   6. Do not use silicone sealant as per the following:
      a. Apply caulking/sealant at temperatures below 40 deg F (4 deg C).
      b. Below-grade applications.
      c. Brass and copper surfaces.
      d. Materials bleeding oils, plasticizers, and solvents.
      e. Structural glazing and adhesive.
      f. Surfaces to be immersed in water for prolonged time.

B. Joint Backing:
   1. Install joint backing to maintain sealant joint ratios recommended by Manufacturer.
   2. Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
   3. Rod for open joints shall be at least 1-1/2 times width of open joint and of thickness to give solid backing. Backing shall fill up joint so depth of sealant bite is no more than 3/8 inch (9.5 mm) deep.

C. Bond Breaker:
   1. Install bond breaker where joint backing is not used or where backing is not feasible.
      a. Apply bond-breaker tape in shallow joints as recommended by Sealant Manufacturer.

D. Sealant:
   1. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint. Apply sealants in vertical joints from bottom to top.
   2. Fill joint opening to full and proper configuration.
   3. Apply in continuous operation.
   4. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface. Tool joints in opposite direction from application direction, i.e., in vertical joints, from the top down. Do not 'wet tool' sealants.
   5. Depth of sealant bite shall be 1/4 inch (6 mm) minimum and 1/2 inch (12.7 mm) maximum, but never more than one half or less than one fourth joint width.

E. Install at perimeter joints and mechanical and electrical penetrations in sound insulated rooms. Apply sealant with hand-caulking gun with nozzle of proper size to fit joints. Use sufficient pressure to insure full contact to both sides of joint to full depth of joint.

F. Tool joints immediately after application of sealant if required to achieve full bedding to substrate or to achieve smooth sealant surface.

G. Caulk gaps between painted or coated substrates and unfinished or pre-finished substrates. Caulk gaps larger than 3/16 inch (5 mm) between painted or coated substrates.

3.04 TOLERANCES

A. Provide joint tolerances in accordance with Manufacturer's printed instructions.

3.05 FIELD QUALITY CONTROL

A. Inspection:
   1. Examine sealant joints to verify compliance with Contract Document requirements.

B. Non-Conforming Work. Non-conforming work as covered in the General Conditions applies, but is not limited to the following:

1. Sealant material found to be contaminated or damaged or inadequate preparation of substrate results in deficiencies in joint sealant adhesion is considered defective or not complying with Contract Document requirements.
2. Correct any work found defective or not-complying with Contract Document requirements at no additional cost to Owner.

C. Adhesion Test (Installer Option to use adhesion test to determine if primer is required).
1. Perform adhesion tests in accordance with Manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant joint Hand-Pull Tab:
   a. Perform five (5) tests for first 1,000 linear feet (300 meters) of applied silicone sealant and one (1) test for each 1,000 linear feet (300 meters) seal thereafter or perform one (1) test per floor per building elevation minimum.
   b. For sealants applied between dissimilar materials, test both sides of joints.
2. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
3. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

3.06 CLEANING

A. Remove sealant from adjacent surfaces in accordance with Sealant Manufacturer and Substrate Manufacturer recommendations as work progresses.

B. Remove masking tape and excess sealant.

C. Clean adjacent materials, which have been soiled, immediately (before setting) as recommended by Manufacturer.

D. Waste Management: Dispose of products in accordance with manufacturer's recommendation.

END OF SECTION

SECTION 09 9113
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Unless otherwise noted, paint color shall be close match to adjacent roofing or metal flashing color.

1.02 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications 2019.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

D. SSPC-SP 1 - Solvent Cleaning 2015, with Editorial Revision (2016).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conferences:
   1. Schedule painting pre-installation conference after delivery of paint or coatings and before or at same time as application of field samples.
      a. Coordinate pre-installation conferences of all related painting and coating Sections under 09 9000 heading ‘Paints and Coatings’.
      b. Schedule conference before preparation of control samples as specified in Sections under 09 9000 heading ‘Paints and Coatings’.
      c. Conference to be held at same time as Section 09 2116 to review gypsum board finish preparation.
   2. In addition to agenda items specified in Section 01 3000, review following:
      a. Review Quality Assurance for Approval requirements.
      b. Review Quality Assurance Field Sample requirements.
      c. Review Submittal requirements for compliance for MPI Approved Products.
      d. Review Design Criteria requirements.
      e. Review Cleaning requirements.
      f. Review painting schedule.
      g. Review safety issues.
   3. Review additional agenda items from Sections under 09 9000 heading ‘Paints and Coatings’.

1.05 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.

5. Confirmation of colors selected and that each area to be painted or coated has color selected for it.

B. Samples: Submit two paper "draw down" samples, 4 x 6 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, submit each color in each sheen available.

C. Closeout Submittals:
   1. Include following in Operations and Maintenance Manual specified in Section 01 7800:
      a. Record Documentation:
         1) Manufacturer’s documentation:
            (a) Manufacturer's cut sheet for each component of each system.
            (b) Schedule showing rooms and surfaces where each system was used.

1.06 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and minimum five (5) satisfactorily completed projects of comparable quality, similar size, and complexity in past three (3) years before bidding.
   1. Maintain qualified crew of painters throughout duration of the Work.
   2. Upon request, submit documentation.

1.07 MOCK-UPS

A. Before application of any paint system, meet on Project site with Architect, Owner's representative, and Manufacturer's representative. Architect may select one (1) surface for application of each paint system specified. This process will include establishing acceptable substrate conditions required for Project before application of paints and coatings.

B. Apply paint systems to surfaces indicated by Architect following procedures outlined in Contract Documents and Product Data submission specified above.

C. After approval of samples, proceed with application of paint system throughout Project. Approved samples will serve as standard of acceptability.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 55 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Deliver amount of materials necessary to meet Project requirements in single shipment.

E. Notify Architect two working days before delivery of coatings.

F. Store materials in single place.

G. Keep storage area clean and rectify any damage to area at completion of work of this Section.

H. Maintain storage area at 55 deg F (13 deg C) minimum.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 540 Lux 50 ft candles measured mid-height at substrate surface.
   1. Inspection of painting work shall take place under same lighting conditions as application.
   2. If painting and coating work is applied under temporary lighting, deficiencies discovered upon installation of permanent lighting will be considered latent damage as defined in MPI Manual, PDCA P1-92.

PART 2 PRODUCTS

2.01 PERFORMANCE AND DESIGN CRITERIA

A. Regulatory Agency Sustainability Approval:
   1. Conform to work place safety regulations and requirements of those authorities having jurisdiction for storage, mixing, application and disposal of all paint and related hazardous materials.
   2. Paint and painting materials shall be free of lead and mercury, and have VOC levels acceptable to local jurisdiction.
   3. Master Painters Institute (MPI) Standards:
      a. Products: Comply with MPI standards indicated and listed in ‘MPI Approved Products List’.
      b. Preparation and Workmanship: Comply with requirements in ‘MPI Architectural Painting Specification Manual’ for products and coatings indicated.

B. Performance:
   1. Design Criteria:
      a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
      b. All materials, preparation and workmanship shall conform to requirements of ‘Architectural Painting Specification Manual’ by Master Painters Institute (MPI).
      c. All paint manufacturers and products used shall be as listed under Approved Product List section of MPI Painting Manual.
      d. Provide Premium Grade systems (2 top coats) as defined in MPI Architectural Painting Specification Manual, except as otherwise indicated.
      e. Where specified paint system does not have Premium Grade, provide Budget Grade.
      f. Provide products of same manufacturer for each coat in coating system.
      g. Color Levels:
         1) Color Level II:
            (a) Number and placement of interior and exterior paint colors and gloss levels shall be as defined by Color Level II from MPI Manual, PDCA P3-93 as modified in following paragraph.
            (b) No more than one paint color or gloss level will be selected for same substrate within designated interior rooms or exterior areas.
         2) Color Level III:
            (a) Number and placement of interior and exterior paint colors and gloss levels shall be Color Level III from MPI Manual, PDCA P3-93 as modified in following paragraph.
            (b) Several paint colors or gloss levels will be selected for same substrate within designated interior rooms or exterior areas.

C. Materials:
   1. Materials used for any painting system shall be from single manufacturer unless approved otherwise in writing by painting system manufacturers and by Architect. Include manufacturer approvals in Product Data submittal.
   2. Linseed oil, shellac, turpentine, and other painting materials shall be pure, be compatible with other coating materials, bear identifying labels on containers, and be of highest

quality of an approved manufacturer listed in MPI manuals. Tinting color shall be best grade of type recommended by Manufacturer of paint or stain used on Project.

2.02 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

2.03 PAINT SYSTEMS - EXTERIOR

A. Manufacturers: Products listed in edition of MPI Approved Product List current at time of bidding and later are approved, providing they meet VOC requirements in force where Project is located.
   1. New Surfaces: Use MPI(a) EXT 5.1M Waterborne Light Industrial Coating system.
   2. Previously Finished Surfaces: Use MPI(r) REX 5.1K Waterborne Light Industrial Coating.

B. Exterior Ferrous Metal:
   1. Materials:
      a. All paints and coatings.
         1) Primer Coat: MPI Product 107, ‘Primer, Rust-Inhibitive, Water Based’.
         2) Finish Coats: MPI Product 163, ‘Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).
      b. Traffic signage:
         1) Primer Coat: MPI Product 107, ‘Primer, Rust-Inhibitive, Water Based’.
         2) Finish Coats: MPI Product 163, ‘Light Industrial Coating, Exterior, Water Based, Semi-Gloss (MPI Gloss Level 5).
   2. Design Criteria:
      a. Systems specified are in addition to prime coats provided under other Sections of Project Manual.
      b. Finish Requirements: Use MPI Premium Grade finish requirements for work of this Section.
      c. Gloss / Sheen Level Required: Gloss Level 5.

C. Exterior Galvanized Metal:
   1. Materials:
      a. Polyurethane:
         1) Vinyl Wash Primer Coat: MPI Product 80: ‘Primer, Vinyl Wash’.
         2) Finish Coats:
            (a) Epoxy MPI Product 101: ‘Primer, Epoxy, Anti-Corrosive, for Metal’.
            (b) Polyurethane MPI Product 72: ‘Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)’.
      b. Latex:
         1) Waterborne Primer Coat: MPI Product 134: ‘Primer, Galvanized, Water Based’.
         2) Finish Coats: MPI Product 11: ‘Latex, Exterior Semi-Gloss (MPI Gloss Level 5)’.
   2. Handrails And Exposed Miscellaneous Structural Steel:
      a. New Surfaces: Use MPI(a) EXT 5.3D Pigmented Polyurethane Finish system.
      b. Previously Finished Work: Use MPI(r) REX 5.3D Pigmented Polyurethane Finish system.
   3. All Other:
      a. New Surfaces: Use MPI(a) EXT 5.3H Latex Finish system.
      b. Previously Finished Surfaces: Use MPI(r) REX 5.3H Latex Finish system.

D. Exterior CMU, Concrete and Stucco:
   1. Materials:
      a. Block Filler, New CMU Only: MPI Product 4: ‘Block Filler, Latex, Interior/Exterior’.
      b. Finish Coats: MPI Product 10: ‘Latex, Exterior Flat (MPI Gloss Level 1-2)’.
      c. Accent Stripe: MPI Product 164: 'Light Industrial Coating, Exterior, Water Based, Gloss (MPI Gloss Level 6)'.

2. Performance:
    a. Finish Requirements:
        1) New Surfaces: MPI Premium Grade finish requirements.
        2) Deteriorated Existing Surfaces: MPI Premium Grade finish requirements.
        3) Sound Existing Surfaces: MPI Custom Grade finish requirements.
        4) Gloss / Sheen Level Required: Gloss Level 1.
    b. Concrete:
        1) New Surfaces: Use MPI(a) EXT 3.1A Latex Finish system.
        2) Previously Finished Surfaces: Use MPI(r) REX 3.1A Latex Finish system.
    c. Stucco:
        1) New Surfaces: Use MPI(a) EXT 3.1A Latex Finish system.
        2) Previously Finished Surfaces: Use MPI(r) REX 3.1A Latex Finish system.
    d. CMU:
        1) New Surfaces: Use MPI(a) EXT 4.2A Latex Finish system.
        2) Previously Finished Surfaces: Use MPI(r) REX 4.2A Latex Finish system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Protection Of In-Place Conditions:
    1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
        a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.

B. Do not begin application of paints and finishes until substrates have been properly prepared.

C. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

F. Test shop-applied primer for compatibility with subsequent cover materials.

G. Verification of Conditions:
    1. Directing applicator to begin painting and coating work will indicate that substrates to receive painting and coating materials have been previously inspected as part of work of other Sections and are complete and ready for application of painting and coating systems as specified in those Sections.

H. Pre-Installation Testing:
    1. Before beginning work of this Section, examine, and test surfaces to be painted or coated for adhesion of painting and coating systems.
    2. Report in writing to Architect of conditions that will adversely affect adhesion of painting and coating work.
    3. Do not apply painting and coating systems until party responsible for adverse condition has corrected adverse condition.

I. Evaluation And Assessment:
    1. Report defects in substrates that become apparent after application of primer or first finish coat to Architect in writing and do not proceed with further work on defective substrate until such defects are corrected by party responsible for defect.

J. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
    1. Exterior Plaster and Stucco: 12 percent.
    2. Fiber Cement Siding: 12 percent.

3. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
5. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

A. Protection of In-Place Conditions:
   1. Protect other finish work and adjacent materials during painting. Do not splatter, drip, or paint surfaces not intended to be painted. These items will not be spelled out in detail but pay special attention to the following:
      a. Do not paint finish copper, bronze, chromium plate, nickel, stainless steel, anodized aluminum, or monel metal except as explicitly specified.

B. Surface Preparation:
   1. Prepare surfaces in accordance with MPI requirements and requirements of Manufacturer for each painting system specified, unless instructed differently in Contract Documents. Bring conflicts to attention of Architect in writing.
   2. Fill minor holes and cracks in wood surfaces to receive paint or stain.
   3. Surfaces to be painted shall be clean and free of loose dirt. Clean and dust surfaces before painting or finishing.
   4. Do no exterior painting while surface is damp, unless recommended by Manufacturer, nor during rainy or frosty weather. Interior surfaces shall be dry before painting. Moisture content of materials to be painted shall be within tolerances acceptable to Paint Manufacturer.
   5. Sand woodwork smooth in direction of grain leaving no sanding marks. Clean surfaces before proceeding with stain or first coat application.

C. Clean surfaces thoroughly and correct defects prior to application.

D. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

E. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

F. Seal surfaces that might cause bleed through or staining of topcoat.

3.03 APPLICATION

A. Interface with Other Work:
   1. Coordinate with other trades for materials and systems that require painting before installation.
   2. Schedule painting and coating work to begin when work upon which painting and coating work is dependent has been completed. Schedule installation of pre-finished and non-painted items, which are to be installed on painted surfaces, after application of final finishes.

B. Paint or finish complete all surfaces to be painted or coated as described in Contract Documents, including but not limited to following items.

C. Apply sealant in gaps 3/16 inch (5 mm) and smaller between two substrates that are both to be painted or coated. Sealants in other gaps furnished and installed under Section 07 9200.

D. On wood to receive a transparent finish, putty nail holes in wood after application of stain using natural colored type to match wood stain color. Bring putty flush with adjoining surfaces.

E. In multiple coat paint work, tint each succeeding coat with slightly lighter color, but approximating shade of final coat, so it is possible to check application of specified number of coats. Tint final coat to required color.

F. Spread materials smoothly and evenly. Apply coats to not less than wet and dry film thicknesses and at spreading rates for specified products as recommended by Manufacturer.

G. Touch up suction spots after application of first finish coat.

H. Paint shall be thoroughly dry and surfaces clean before applying succeeding coats.

I. Use fine sandpaper between coats as necessary to produce even, smooth surfaces.

J. Make edges of paint adjoining other materials or colors clean, sharp, and without overlapping.

K. Finished work shall be a 'Properly Painted Surface' as defined in this Section.

L. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

M. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

N. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

O. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

P. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

Q. Apply each coat to uniform appearance.

R. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.

S. Exterior Ferrous Metal:
   1. New Surfaces: Clean metal to be painted of rust, mill scale, grease, oil, and welding spatters, burrs, flux, slag, and fume. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
   2. Existing Painted Surfaces:
      a. Remove deteriorated and chalked existing paint and rust down to sound substrate by scraping or power tools.
      b. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer. If all traces of rust cannot be removed, apply rust blocker recommended by Paint Manufacturer before applying primer coat.
      c. Spot prime bare metal surfaces followed by a prime coat over entire surface to be painted.
      d. Lightly sand entire surface.
      e. Clean surface as recommended by Paint Manufacturer.
      f. Apply specified finish coats.

T. Exterior Galvanized Metal:
   1. New Surfaces:
      a. Clean 'passivated' or 'stabilized' galvanized steel as specified in SSPC-SP 1.
      b. After removal of 'passivated' or 'stabilized' coating or for surfaces without coating, clean surfaces to be painted with mineral spirits or product recommended by Paint Manufacturer. Change to clean rags or wiping cloths regularly to reduce possibility of re-contamination of surface.
      c. Apply prime coat.
      d. Apply finish coats.
   2. Existing Painted Surfaces:
      a. Remove deteriorated and chalked existing paint and rust deposits down to sound substrate by sanding, scraping, or wire brushing.
      b. Clean existing sound painted surfaces as well as scraped and sanded existing painted surfaces as recommended by Paint Manufacturer.
      c. Apply prime coat.
      d. Apply finish coats.
   3. Existing Unpainted Surfaces:
      a. Wire brush or power wash as necessary to remove 'white rust'.

b. Apply prime coat.
c. Apply finish coats.

U. Exterior CMU, Concrete, Stucco
1. New Surfaces:
a. On highly porous surfaces when weather is exceptionally hot and dry, it may be desirable to dampen surface before applying first coat of an emulsion paint.
b. Completely cover voids in masonry block.
c. Roll after spraying if necessary to eliminate pinholing.
2. Existing Unpainted Surfaces:
a. Power wash surfaces to be painted.
b. Fill cracks with masonry crack filler.
c. Apply block filler and finish coat as required for new work.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

B. Owner will provide field inspection.

C. Non-Conforming Work:
1. Correct deficiencies in workmanship as required to leave surfaces in conformance with 'Properly Painted Surface,' as defined in this Section.
2. Correction of 'Latent Damage' and 'Damage Caused By Others,' as defined in this Section, is not included in work of this Section.

3.05 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. As work proceeds and upon completion of work of any painting Section, remove paint spots from floors, walls, glass, or other surfaces and leave work clean, orderly, and in acceptable condition.

C. Waste Management:
1. Remove rags and waste used in painting operations from building each night. Take every precaution to avoid danger of fire.
2. Paint, stain and wood preservative finishes and related materials (thinners, solvents, caulking, empty paint cans, cleaning rags, etc.) shall be disposed of subject to regulations of applicable authorities having jurisdiction.
3. Remove debris caused by work of paint Sections from premises and properly dispose.
4. Retain cleaning water and filter out and properly dispose of sediments.

3.06 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 9113

SECTION 22 0501
COMMON WORK RESULTS FOR PLUMBING

PART 1 GENERAL

1.01 SUMMARY

A. Includes But Not Limited To:
   1. Common requirements and procedures for plumbing systems.
   2. Furnish and install sealants relating to installation of systems installed under this Division.

B. Products Furnished But Not Installed Under This Section:
   1. Sleeves, inserts, supports, and equipment for plumbing systems installed under other Sections.

1.02 RELATED REQUIREMENTS

A. Section 05 5000 - Metal Fabrications: Quality and requirements for welding.

B. Section 07 9200 - Joint Sealants: Elastomeric Joint Sealant: Quality at building exterior.

C. Sections 09 9113 - Exterior Painting: Painting of plumbing items requiring field painting.

D. Section 22 0529 – Hangers and Supports for Plumbing Piping and Equipment.

E. Slots and openings through floors, walls, ceilings, and roofs provided under other Divisions in their respective materials.

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

B. FM (AG) - FM Approval Guide current edition.

C. ITS (DIR) - Directory of Listed Products Current Edition.

D. NEMA MG 1 - Motors and Generators 2021.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL (DIR) - Online Certifications Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

A. See sections in Division 22 specifications for submittal and warranty requirements.

B. Project Record Documents: Record actual locations of new and existing roof drain piping.

1.06 QUALITY ASSURANCE

A. Qualifications: Requirements of Section 01 4000 - Quality Requirements apply, but not limited to the following:
   1. Plumbing Subcontractor:
      a. Company specializing in performing work of this section.
         1) Minimum five (5) years experience in plumbing installations.
         2) Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
      b. Upon request, submit documentation.
   2. Installer:
      a. Licensed for area of Project.

b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project.
c. Upon request, submit documentation.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

D. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements:
1. Accept valves on site in shipping containers with labeling in place.
2. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

B. Storage and Handling Requirements:
1. In addition to requirements specified in Division 01, stored material shall be readily accessible for inspection by Architect until installed.
2. Store items subject to moisture damage in dry, heated spaces.

1.08 WARRANTY

A. Manufacturer Warranty:
1. Provide certificates of warranty for each piece of equipment made out in favor of the Owner.

B. Special Warranty:
1. Guarantee plumbing systems to be free from noise in operation that may develop from failure to construct system in accordance with Contract Documents.
2. If plumbing sub-contractor with offices located more than 150 miles from Project site is used, provide service / warranty work agreement for warranty period with local plumbing sub-contractor approved by Architect. Include copy of service / warranty agreement in warranty section of Operation And Maintenance Manual.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Components shall bear Manufacturer's name and trade name. Equipment and materials of same general type shall be of same make throughout work to provide uniform appearance, operation, and maintenance.

B. Pipe and Pipe Fittings:
1. Weld-O-Let and Screw-O-Let fittings are acceptable.

C. Sleeves:
1. General:
a. Two sizes larger than bare pipe or insulation on insulated pipe.
2. In Concrete and Masonry:
a. Standard weight galvanized iron pipe, Schedule 40 PVC, or 14 gage galvanized sheet metal.

D. Valves:
1. Valves of same type shall be of same manufacturer.

PART 3 EXECUTION

3.01 INSTALLERS

A. Acceptable Installers:

1. Meet Quality Assurance Installer Qualifications as specified in Part 1 of this specification.

B. Substitution Limitations: Same as specified for products; see Section 01 6000 - Product Requirements.

3.02 EXAMINATION

A. Drawings:
1. Plumbing Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
2. Mechanical Drawings show general arrangement of piping, equipment, etc. Follow as closely as actual building construction and work of other trades will permit.
3. Consider Architectural and Structural Drawings part of this work insofar as these drawings furnish information relating to design and construction of building. These drawings take precedence over Plumbing Drawings.
4. Because of small scale of Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves, and accessories required to meet conditions.

B. Verification of Conditions:
1. Examine premises to understand conditions that may affect performance of work of this Division before submitting proposals for this work. Examine adjoining work on which plumbing work is dependent for efficiency and report work that requires correction.
2. Ensure that items to be furnished fit space available. Make necessary field measurements to ascertain space requirements including those for connections and furnish and install equipment of size and shape so final installation shall suit true intent and meaning of Contract Documents. If approval is received by Addendum or Change Order to use other than originally specified items, be responsible for specified capacities and for ensuring that items to be furnished will fit space available.
3. Check that slots and openings provided under other Divisions through floors, walls, ceilings, and roofs are properly located. Perform cutting and patching caused by neglecting to coordinate with Divisions providing slots and openings at no additional cost to Owner.
4. No subsequent allowance for time or money will be considered for any consequence related to failure to examine site conditions.

3.03 PREPARATION

A. Changes Due to Equipment Selection:
1. Where equipment specified or otherwise approved requires different arrangement or connections from that shown in Contract Documents, submit drawings showing proposed installations.
2. If proposed changes are approved, install equipment to operate properly and in harmony with intent of Contract Documents. Make incidental changes in piping, ductwork, supports, installation, wiring, heaters, panelboards, and as otherwise necessary.
3. Provide additional motors, valves, controllers, fittings, and other equipment required for proper operation of systems resulting from selection of equipment.
4. Be responsible for proper location of rough-in and connections provided under other Divisions.

3.04 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Interface With Other Work:
1. Furnish exact location of electrical connections and complete information on motor controls to installer of electrical system.
2. Furnish sleeves, inserts, supports, and equipment that are to be installed by others in sufficient time to be incorporated into construction as work proceeds. Locate these items and confirm that they are properly installed.

3. Furnish inserts for attaching hangers that are to be cast in concrete floor construction to Division 03 at time floors are poured.

C. Cut carefully to minimize necessity for repairs to previously installed or existing work. Do not cut beams, columns, or trusses.

D. Locating Equipment:
   1. Arrange pipes and equipment to permit ready access to valves, cocks, unions, traps, and to clear openings of doors and access panels.
   2. Adjust locations of pipes, equipment, and fixtures to accommodate work to interferences anticipated and encountered.
   3. Install plumbing work to permit removal of equipment and parts of equipment requiring periodic replacement or maintenance without damage to or interference with other parts of equipment or structure.
   4. Determine exact route and location of each pipe before fabrication.
      a. Right-Of-Way:
         1) Lines that pitch shall have right-of-way over those that do not pitch. For example, plumbing drains shall normally have right-of-way.
         2) Lines whose elevations cannot be changed shall have right-of-way over lines whose elevations can be changed.
      b. Offsets, Transitions, and Changes in Direction:
         1) Make offsets, transitions, and changes in direction in pipes as required to maintain proper head room and pitch of sloping lines whether or not indicated on Drawings.
         2) Furnish and install all traps, air vents, sanitary vents, and devices as required to effect these offsets, transitions, and changes in direction.

E. Penetration Firestops:
   1. Install Penetration Firestop System appropriate for penetration at plumbing systems penetrations through walls, ceilings, roofs, and top plates of walls.

F. Sealants:
   1. Seal openings through building exterior caused by penetrations of elements of plumbing systems.
   2. Furnish and install acoustical sealant to seal penetrations through acoustically insulated walls and ceilings.

G. Furnish and install complete system of piping, valved as indicated or as necessary to completely control entire apparatus:
   1. Pipe drawings are diagrammatic and indicate general location and connections. Piping may have to be offset, lowered, or raised as required or directed at site. This does not relieve this Division from responsibility for proper installation of plumbing systems.
   2. Arrange piping to not interfere with removal of other equipment, ducts, or devices, or block access to doors, windows, or access openings:
      a. Arrange so as to facilitate removal of tube bundles.
      b. Provide accessible flanges or ground joint unions, as applicable for type of piping specified, at connections to equipment and on bypasses.
         1) Make connections of dissimilar metals with di-electric unions.
         2) Install valves and unions ahead of traps and strainers. Provide unions on both sides of traps.
      c. Do not use reducing bushings, bull head tees, close nipples, or running couplings. Street elbows are allowed only on potable water pipe 3/4 inch in diameter and smaller.
      d. Install piping systems so they may be easily drained.
      e. Install piping to insure noiseless circulation.
      f. Place valves and specialties to permit easy operation and access. Valves shall be regulated, packed, and glands adjusted at completion of work before final acceptance.

g. Do not install piping in shear walls.
h. Cut piping accurately to measurements established at site. Remove burr and cutting slag from pipes.
i. Work piping into place without springing or forcing.
j. Make changes in direction with proper fittings.

3. Expansion of Thermoplastic Pipe:
   a. Provide for expansion in every 30 feet of straight run.
   b. Provide 12 inch offset below roof line in each vent line penetrating roof.
4. Expansion of PEX Pipe: Allow for expansion and contraction of PEX pipe as recommended by Pipe Manufacturer.

H. Sleeves:
1. Do not place sleeves around soil, waste, vent, or roof drain lines passing through concrete slabs on grade.
2. Provide sleeves around pipes passing through concrete or masonry floors, walls, partitions, or structural members. Seal sleeves with specified sealants. Follow Pipe Manufacturer's recommendations for PEX pipe penetrations through studs and floor slabs.
3. Sleeves through floors shall extend 1/4 inch (6 mm) above floor finish in mechanical equipment rooms above basement floor. In other rooms, sleeves shall be flush with floor.
4. Sleeves through floors and foundation walls shall be watertight.

I. Escutcheons:
1. Provide spring clamp plates where pipes run through walls, floors, or ceilings and are exposed in finished locations of building. Plates shall be chrome plated heavy brass of plain pattern and shall be set tight on pipe and to building surface.

3.05 REPAIR / RESTORATION

A. Each Section of this Division shall bear expense of cutting, patching, repairing, and replacing of work of other Sections required because of its fault, error, tardiness, or because of damage done by it:
1. Patch and repair walls, floors, ceilings, and roofs with materials of same quality and appearance as adjacent surfaces unless otherwise shown.
2. Surface finishes shall exactly match existing finishes of same materials.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Field Tests:
1. Perform tests on HVAC piping systems. Furnish devices required for testing purposes.

C. Non-Conforming Work:
1. Replace material or workmanship proven defective with sound material at no additional cost to Owner.
2. Repeat tests on new material, if requested.

3.07 CLEANING

A. Remove dirt, grease, and other foreign matter from each length of piping before installation:
1. After each section of piping used for movement of water or steam is installed, flush with clean water, except where specified otherwise.
2. Arrange temporary flushing connections for each section of piping and arrange for flushing total piping system.
3. Provide temporary cross connections and water supply for flushing and drainage and remove after completion of work.

B. Clean exposed piping, equipment, and fixtures. Remove stickers from fixtures and adjust flush valves.

C. See Section 01 7419 - Construction Waste Management and Disposal, for additional requirements.

3.08 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

3.09 PROTECTION

A. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system. Cap or plug open ends of pipes and equipment to keep dirt and other foreign materials out of system. Do not use plugs of rags, wool, cotton waste, or similar materials. Protect plastic pipe from exposure to sunlight as appropriate.

END OF SECTION

SECTION 22 0529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Concrete equipment pads.

B. Section 05 5000 - Metal Fabrications.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position 2022.

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2022.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a.

G. MFMA-4 - Metal Framing Standards Publication 2004.

H. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

I. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 3000.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
   1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.

D. Derating Calculations for Fiberglass Strut Channel Framing Systems: Indicate load ratings adjusted for applicable service conditions.

E. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

F. Installer's Qualifications: Include evidence of compliance with specified requirements.

G. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 QUALITY ASSURANCE

A. Comply with applicable building code.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.

D. Installer Qualifications for Field-Welding: As specified in Section 05 5000.

E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.

B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.

C. Materials for Metal Fabricated Supports: Comply with Section 05 5000.
   1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
   2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

D. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.02 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with MSS SP-58.
   2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of [_____]. Include consideration for vibration, equipment operation, and shock loads where applicable.
   5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Materials for Metal Fabricated Supports: Comply with Section 05 5000.

C. Metal Channel (Strut) Framing Systems:
1. Manufacturers:
    a. Anvil International, www.anvilintl.com.
    b. Cooper B-Line, a division of Eaton Corporation, www.cooperindustries.com/#sle.
    c. Thomas & Betts Corporation, www.tnb.com/#sle.
    d. Unistrut, a brand of Atkore International Inc, www.unistrut.com/#sle.
    e. Substitutions: See Section 01 6000 - Product Requirements.
    f. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
3. Comply with MFMA-4.
4. Channel Material:
    a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
6. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.

D. Fiberglass Channel (Strut) Framing Systems: Factory-fabricated continuous-slot fiberglass channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Manufacturers:
    a. Enduro Composites, www.endurocomposites.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.
    c. Source Limitations: Furnish channels (struts) and associated fittings, accessories, and hardware produced by a single manufacturer.
2. Channel Material: Use polyester resin or vinyl ester resin.
3. Minimum Channel Dimensions: 1-5/8 inch width by 1 inch height.
4. Flammability: Fire retardant with NFPA 101, Class A flame spread index (maximum of 25) when tested in accordance with ASTM E84; self-extinguishing in accordance with ASTM D635.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    a. Equipment Supports: 1/2 inch diameter.
    b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
    c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
    d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.

F. Thermal Insulated Pipe Supports:
1. Manufacturers:
    a. KB Enterprises, www.snappitz.com/#sle.
    b. Substitutions: See Section 01 6000 - Product Requirements.
2. General Construction and Requirements:

a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by a 360 degree, PVC jacketing.

3. PVC Jacket:
a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
b. Minimum Service Temperature: Minus 40 degrees F.
c. Maximum Service Temperature: 180 degrees F.
d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
e. Thickness: 60 mil.
f. Connections: Brush on welding adhesive.

4. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.

G. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation, www.cooperindustries.com/#sle.
b. Erico International Corporation, a brand of Pentair, www.erico.com/#sle.
c. PHP Systems/Design, www.phpsd.com/#sle.
d. Unistrut, a brand of Atkore International Inc, www.unistrut.com/#sle.
e. Substitutions: See Section 01 6000 - Product Requirements.

2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.

H. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
a. Hilti, Inc, www.us.hilti.com/#sle.
b. ITW Red Head, a division of Illinois Tool Works, Inc, www.itwredhead.com/#sle.
c. Powers Fasteners, Inc, www.powers.com/#sle.
d. Simpson Strong-Tie Company Inc, www.strongtie.com/#sle.
e. Substitutions: See Section 01 6000 - Product Requirements.

2. Manufacturers - Powder-Actuated Fastening Systems:
a. Hilti, Inc, www.us.hilti.com/#sle.
b. ITW Ramset, a division of Illinois Tool Works, Inc, www.ramset.com/#sle.
c. Powers Fasteners, Inc, www.powers.com/#sle.
d. Simpson Strong-Tie Company Inc, www.strongtie.com/#sle.
e. Substitutions: See Section 01 6000 - Product Requirements.

3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
6. Hollow Masonry: Use toggle bolts.
7. Hollow Stud Walls: Use toggle bolts.

8. Steel: Use beam clamps, machine bolts, or welded threaded studs.
9. Sheet Metal: Use sheet metal screws.
10. Wood: Use wood screws.
11. Plastic and lead anchors are not permitted.
12. Powder-actuated fasteners are not permitted.
    a. Where approved by Architect.
    b. Use only threaded studs; do not use pins.
13. Hammer-driven anchors and fasteners are not permitted.
    a. Nails are permitted for attachment of nonmetallic boxes to wood frame construction (when specified).
    b. Staples are permitted for attachment of nonmetallic-sheathed cable to wood frame construction (when specified).
14. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    a. Comply with MFMA-4.
    b. Channel Material: Use galvanized steel.
    c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
    d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
15. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Interface With Other Work:
   1. Furnish inserts for attaching hangers that are to be cast in concrete floor construction to Division 03 at time floors are poured.

B. Piping:
   1. Properly support piping and make adequate provisions for expansion, contraction, slope, and anchorage.
      a. Except for underground pipe, suspend piping from roof trusses or clamp to vertical walls using Unistrut and clamps. Do not hang pipe from other pipe, equipment, or ductwork. Laying of piping on any building element is not allowed.
      b. Supports For Horizontal Piping:
         1) Support metal piping at 96 inches (2 400 mm) on center maximum for pipe 1-1/4 inches (32 mm) or larger and 72 inches (1 800 mm) on center maximum for pipe 1-1/8 inch (29 mm) or less.
         2) Support thermoplastic pipe at 48 inches (1 200 mm) on center maximum.
         3) Support PEX pipe at 32 inches (800 mm) minimum on center.
         4) Provide support at each elbow. Install additional support as required.
      c. Supports for Vertical Piping:
         1) Place riser clamps at each floor or ceiling level.
         2) Securely support clamps by structural members, which in turn are supported directly from building structure.
         3) Provide clamps as necessary to brace pipe to wall.
      d. Install supports from inserts cast into concrete floor system, including concrete joists and floor slabs. Where inserts cannot be used, provide expansion shields and support hangers from angles held in place by expansion bolts, never directly from

expansion bolt itself. Provide calculations necessary to determine number of expansion bolts required to equal capacity of cast-in-place insert.

e. Attach Unistrut to structural steel roof supporting structure. Spacing and support as described above.

f. Insulate hangers for copper pipe from piping by means of at least two layers of Scotch 33 plastic tape.

2. Gas piping Identification:

a. Apply paint identification for gas piping used with HVAC equipment as specified in Section 23 0553.

C. Install products in accordance with manufacturer's instructions.

D. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

E. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

F. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

G. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

H. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

I. Field-Welding (where approved by Architect): Comply with Section 05 5000.

J. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

K. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 03 3000.
5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

L. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

M. Secure fasteners according to manufacturer's recommended torque settings.

N. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Section 01 3216 - Construction Progress Schedule: Scheduling of equipment and materials removed by Owner.

B. Section 01 4000 - Quality Requirements

C. Section 02 4100 - Demolition: Salvage of existing electrical items to be reused or recycled.

1.02 REFERENCES

A. National Fire Protection Association / American National Standards Institute: NFPA 70 National Electric Code (NEC).

B. National Electrical Manufacturing Association Standards (NEMA): NEMA 250, 'Enclosure for Electrical Equipment (1000 Volts Maximum)'.

1.03 SUMMARY

A. Section Includes:
   1. Electrical equipment coordination and installation.

1.04 SUBMITTALS

A. Refer to individual material specification sections for submittal requirements.

1.05 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

1.06 QUALIFICATIONS

A. Requirements of Section 01 4000 - Quality Requirements applies, but not limited to following:
   1. Electrical Subcontractor:
      a. Company specializing in performing work of this project.
      b. Minimum five (5) years experience in electrical installations.
      c. Minimum five (5) satisfactorily completed installations in past three (3) years of projects similar in size, scope, and complexity required for this project before bidding.
      d. Upon request, submit documentation.
   2. Installer:
      a. Licensed in state where work is to be performed.
      b. Designate one (1) individual as project foremen who shall be on site at all times during installation and experienced with installation procedures required for this project. Foreman shall have at least a journeyman's electrician license.
      c. Upon request, submit documentation.
      d. Approved Installers:
         1) Approved Electrical Subcontractor shall be pre-approved in accordance with Supplementary Conditions and included in Construction Documents by Addendum.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

A. Equipment provided under following Sections shall be by the same Manufacturer:
   1. Section 26 2816.13 - Enclosed Circuit Breakers

2.02 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
   1. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
   2. Pressure Plates: Carbon steel. Include two for each sealing element.
   3. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

B. Manufacturers:
   1. OZ-Gedney type WSK.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examination
   1. Verification Of Conditions:
      a. Confirm dimensions, ratings, and specifications of equipment to be installed and coordinate these with site dimensions and with other Sections.
   2. Evaluation And Assessment:
      a. All relocations, reconnections, and removals are not necessarily indicated on Drawings. Include such work without additional cost to Owner.

B. Preparation
   1. Disconnect equipment that is to be removed or relocated. Carefully remove, disassemble, or dismantle as required, and store in approved location on site, existing items to be reused in completed work.
   2. Where affected by demolition or new construction, relocate, extend, or repair raceways, conductors, outlets, and apparatus to allow continued use of electrical system. Use methods and materials as specified for new construction.
   3. Perform drilling, cutting, block-offs, and demolition work required for removal of necessary portions of electrical system. Do not cut joists, beams, girders, trusses, or columns without prior written permission from Architect.
   4. Remove concealed wiring abandoned due to demolition or new construction. Remove circuits, conduits, and conductors that are not to be re-used back to next active fixture, device, or junction box.
   5. Patch, repair, and finish surfaces affected by electrical demolition work, unless work is specifically specified to be performed under other Sections of the specifications.

3.02 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Comply with applicable provisions of Occupational Safety and Health Act (OSHA), NFPA Standards and Pamphlets, NEIS Standards, and common work place practice.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Locations of electrical equipment shown on Drawings are approximate only. Field verify actual locations for proper installation.

F. Coordinate electrical equipment locations and conduit runs with those providing equipment to be served before installation or rough in.
   1. Notify Architect of conflicts before beginning work.

2. Coordinate locations of power and lighting outlets in mechanical rooms and other areas with mechanical equipment, piping, ductwork, cabinets, etc, so they will be readily accessible and functional.

G. Work related to other trades which is required under this Division, such as cutting and patching, trenching, and backfilling, shall be performed according to standards specified in applicable Sections.

3.03 FIELD QUALITY CONTROL

A. Test systems and demonstrate equipment as working and operating properly. Notify Architect before test. Rectify defects at no additional cost to Owner.

B. Measure current for each phase of each motor under actual final load operation, i.e. after air balance is completed for fan units, etc. Record this information along with full-load nameplate current rating and size of thermal overload unit installed for each motor.

C. Refer to individual equipment and material specification sections for additional testing requirements.

3.04 CLEANING

A. Remove abandoned raceways, conductors, apparatus, and lighting fixtures promptly from site and dispose of legally.

3.05 CLOSEOUT ACTIVITIES

A. Training:
1. Provide instructor to train Owner’s maintenance personnel in operation and maintenance of electrical equipment and systems. Factory representatives shall assist this instruction as necessary.
2. Schedule instruction period at time of final inspection.
3. Refer to individual material and equipment specification sections for additional training requirements.

3.06 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Section 07 8400 - Firestopping.

END OF SECTION

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SECTION 26 0519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Metal-clad cable.

C. Wiring connectors.

D. Electrical tape.

E. Heat shrink tubing.

F. Oxide inhibiting compound.

G. Wire pulling lubricant.

H. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 26 0500 - Common Work Results for Electrical

B. Section 26 0526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.

H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

I. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.

J. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.

K. UL 267 - Outline of Investigation for Wire-Pulling Compounds Most Recent Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.

N. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.

O. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

P. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

1.04 DEFINITIONS

A. Line Voltage: Over 70 Volts.

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.06 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

B. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.

C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.07 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Metal-clad cable is permitted only as follows:
   1. Where not otherwise restricted, may be used:
      a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      b. Where concealed in hollow stud walls, above accessible ceilings, and under raised floors for branch circuits up to 20 A.
         1) Exception: Provide single conductor building wire in raceway for circuit homerun from first outlet to panelboard.
   2. In addition to other applicable restrictions, may not be used:
      a. Where not approved for use by the authority having jurisdiction.

b. Where exposed to view.
c. Where exposed to damage.
d. Where in contact with earth.
e. Where in contact with concrete.
f. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.
g. For isolated ground circuits, unless provided with an additional isolated/insulated grounding conductor.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductors for Grounding and Bonding: Also comply with Section 26 0526.

H. Conductor Material:
1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
2. Provide copper conductors except where aluminum conductors are specifically indicated or permitted for substitution. Conductor sizes indicated are based on copper unless specifically indicated as aluminum. Conductors designated with the abbreviation "AL" indicate aluminum.
a. Substitution of aluminum conductors for copper is permitted, when approved by Owner and authority having jurisdiction, only for the following:
1) Services: Copper conductors size #6 and larger.
2) Feeders: Copper conductors size #6 and larger.
b. Where aluminum conductors are substituted for copper, comply with the following:
1) Size aluminum conductors to provide, when compared to copper sizes indicated, equivalent or greater ampacity and equivalent or less voltage drop.
2) Increase size of raceways, boxes, wiring gutters, enclosures, etc. as required to accommodate aluminum conductors.
3. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
4. Tinned Copper Conductors: Comply with ASTM B33.

I. Minimum Conductor Size:
1. Branch Circuits: 12 AWG.
a. Exceptions:
1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
2) 20 A, 277 V circuits longer than 150 feet: 10 AWG, for voltage drop.

J. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

K. Conductor Color Coding:
1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.

3. Color Code:
    a. 208Y/120 V, 3 Phase, 4 Wire System:
        1) Phase A: Black.
        2) Phase B: Red.
        3) Phase C: Blue.
        4) Neutral/Grounded: White.
    b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
    1. Copper Building Wire:
        a. Cerro Wire LLC: www.cerrowire.com/#sle.
        b. Encore Wire Corporation: www.encorewire.com/#sle.
        c. General Cable Technologies Corporation: www.generalcable.com/#sle.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
    1. Feeders and Branch Circuits:
        a. Size 10 AWG and Smaller: Solid.
        b. Size 8 AWG and Larger: Stranded.
        c. Wiring inside of walk-in cooler and freezer shall be stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
    1. Copper Building Wire: Type THHN/THWN-2 or XHHW-2, except as indicated below.
        a. Conductors in walk-in cooler and freezer: Type XHHW only.

2.04 METAL-CLAD CABLE

A. Manufacturers:
    1. AFC Cable Systems Inc: www.afcweb.com/#sle.
    2. Encore Wire Corporation: www.encorewire.com/#sle.
    3. Southwire Company: www.southwire.com/#sle.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
    1. Size 10 AWG and Smaller: Solid.
    2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Grounding: Full-size integral equipment grounding conductor.

G. Armor: Steel, interlocked tape.

H. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

2.05 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 0526.

C. Wiring Connectors for Splices and Taps:
    1. Copper Conductors Size 8 AWG and Smaller: Use re-usable compression connectors.
    2. Copper Conductors Size 6 AWG and Larger: Use compression connectors.

3. Connections Outside Building: Watertight steel spring wire connections with waterproof, non-hardening sealant.

D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
5. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
6. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.
7. Conductors for Control Circuits: Use crimped terminals for all connections.

E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.

F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
1. Manufacturers:
a. 3M: www.3m.com/#sle.
b. NSI Industries LLC: www.nsiindustries.com/#sle.

G. Push-in Wire Connectors: Rated 600 V, 221 degrees F.
1. Manufacturers:
a. Ideal Industries, Inc: www.idealindustries.com/#sle.
b. NSI Industries LLC: www.nsiindustries.com/#sle.

H. Mechanical Connectors: Provide bolted type or set-screw type.
1. Manufacturers:
a. Burndy LLC: www.burndy.com/#sle.
b. Ilsco: www.ilsco.com/#sle.
c. Thomas & Betts Corporation: www.tnb.com/#sle.

I. Compression Connectors: Provide circumferential type or hex type crimp configuration.

J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
1. Manufacturers:
a. Burndy LLC: www.burndy.com/#sle.
b. Thomas & Betts Corporation: www.tnb.com/#sle.

K. Power Distribution Block: Terminals suitable for use with 75°F (24°C) copper conductors.
1. 16323 by Cooper Bussmann, Ellisville, MO www.bussmann.com
2. LBA363106 by Square D Co, Palatine, IL www.us.squared.com.
3. Substitutions: See Section 01 6000 - Product Requirements

2.06 ACCESSORIES

A. Electrical Tape:
1. Manufacturers:
a. 3M: www.3m.com/#sle.
2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.

3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil; suitable for continuous temperature environment up to 176 degrees F.
6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil; suitable for continuous temperature environment up to 221 degrees F.
7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.

B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
1. Manufacturers:
a. 3M: www.3m.com/#sle.
b. Burndy LLC: www.burndy.com/#sle.

C. Wire Pulling Lubricant:
1. Listed and labeled as complying with UL 267.
2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
3. Suitable for use at installation temperature.

D. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

F. Verify that raceway system is complete, and cabinets and outlet boxes are free of foreign matter and moisture.

3.02 PREPARATION

A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

3.03 INSTALLATION

A. Circuiting Requirements:
1. Unless dimensioned, circuit routing indicated is diagrammatic.
2. When circuit destination is indicated without specific routing, determine exact routing required.
3. Install circuits as shown in Panel Schedules. Group circuit homeruns to panels as shown on Contract Drawings.
4. Arrange circuiting to minimize splices. Conductors and cables shall be continuous from outlet to outlet.
5. Include circuit lengths required to install connected devices within 10 ft of location indicated.

6. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
7. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
8. Install wiring of different voltage systems in separate conduits.
9. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is permitted, under the following conditions:
   a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
   b. Increase size of conductors as required to account for ampacity derating.
   c. Size raceways, boxes, etc. to accommodate conductors.
10. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install metal-clad cable (Type MC) in accordance with NECA 120.

E. Pre-wired 3/8-inch flexible fixture whips: Allowed only for connection to recessed lighting fixtures, lengths not to exceed 72 inches.

F. Installation in Raceway:
1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
2. Pull all conductors and cables together into raceway at same time.
3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

G. Exposed Cable Installation (only where specifically permitted):
1. Route cables parallel or perpendicular to building structural members and surfaces.
2. Protect cables from physical damage.

H. Line Voltage Cable Installation:
1. Where installing in framing, do not bore holes in joists or beams outside center 1/3 of member depth or within 24 inches (600 mm) of bearing points. Do not bore holes in vertical framing members outside center 1/3 of member width. Holes shall be one inch diameter maximum.
2. Conceal cables within ceilings and walls of finished areas. Cables may be exposed in unfinished areas but not run on floors of mechanical equipment spaces or in such a way that they obstruct access to, operation of, or servicing of equipment.
3. Install exposed cables parallel to or at right angles to building structure lines.
4. Keep cables 6 inches (150 mm) minimum from hot water pipes.
5. Do not support cables from mechanical ducts or duct supports without Architect’s written approval.
6. Do not bore holes in vertical truss members or notch structural members for cable installation.

I. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

J. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

1. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conductors and cables to lay on ceiling tiles.

K. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

L. Install conductors with a minimum of 12 inches of slack at each outlet.

M. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

N. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

O. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

P. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
   1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
      b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
   2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
      a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
      b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
   3. Wet Locations: Use heat shrink tubing.

Q. Insulate ends of spare conductors using vinyl insulating electrical tape.

R. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.

S. Identify conductors and cables in accordance with Section 26 0553.

T. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

U. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
   1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.

C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

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SECTION 26 0520
HEATING CABLES

PART 1 GENERAL

1.01 SUMMARY

A. Includes But Not Limited To:
   1. Furnish and install electric heating cable system for rain gutters and roof eaves as described in Contract Documents.
   2. Furnish and install electric heating cable system for rain gutters as described in Contract Documents.
   3. Furnish and install electric heating cable for freezer sub-floor heat trace system as described in Contract Documents.

1.02 RELATED REQUIREMENTS

A. Section 07 7200 - Roof Accessories

B. Section 26 0500 - Common Work Results for Electrical.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Action Submittals:
   1. Shop Drawings:
      a. Rain Gutter and Roof Eaves:
         1) Show layout spacing and cable sizing required by Cable Manufacturer for site conditions. Provide watts per lineal feet at required AC voltage for cable to be used.
      b. Rain Gutter:
         1) Show layout spacing and cable sizing required by Cable Manufacturer for site conditions. Provide watts per lineal feet at required AC voltage for cable to be used.
      c. Heating cable for freezer sub-floor heat trace system:
         1) Show layout spacing required by Cable Manufacturer.

C. Informational Submittals:
   1. Qualification Statements:
      a. Installer:
         1) Show Factory Certification if required.

D. Closeout Submittals:
   1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
      a. Warranty Documentation:
         1) Include copy of final, executed warranty.

1.04 QUALITY ASSURANCE

A. Qualifications: Requirements of Section 01 4000 applies but not limited to following:
   1. Installers:
      a. Installer shall be performed by Factory Certified Installer.
      b. Provide documentation if requested by Architect.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Manufacturer Warranty:
   1. Rain Gutter System:
      a. Manufacturer's ten (10) year warranty covering workmanship and defective materials.
   2. Heating Cable for Freezer Sub-Floor Heat Trace System.

a. Manufacturer's two (2) year warranty covering heat cables, connections and accessories.

PART 2 PRODUCTS

2.01 SYSTEMS

A. Manufacturers:
1. Manufacturer Contact List:
a. Johnson Controls, Inc., Milwaukee, WI www.johnsoncontrols.com.
b. Pass & Seymour, Syracuse, NY or Pass & Seymour Canada Inc, Concord, ON www.passandseymour.com.
c. ProLine, Draper, UT www.prolineradiant.com.
d. Raychem Corporation, Menlo Park, CA www.tycothermal.com or Raychem Canada Ltd, Toronto, ON (800)988-5171 or (416) 234-0886. Raychem sold thru Pentair, Houston, TX www.chemelex.com.
e. Siemens Industry, Buffalo Grove, IL www.usa.siemens.com.
f. Square D Co, Palatine, IL www.us.squared.com or Square D Co / Schneider Electric, Toronto, ON (800) 565-6699 or (416) 752-8020.
g. WarmZone Inc, Salt Lake City, UT www.warmzone.com.

B. Materials:
1. Rain Gutter And Roof Eave Heaters:
a. Cable:
1) Quality Standard. See Section 01 6000:
(a) Raychem GM-1X for 120 V or GM-2X for 208-277.
b. Temperature And Moisture Sensors:
1) Design Standard:
(a) Gutter Sensor: GIT-1 by Raychem.
(b) Roof Sensor: Snow Owl by Raychem.
c. Contactor (if required):
1) Approved Products. See Section 01 6000:
(a) Easy Heat: PC series.
(b) Square 'D': Class 8502.
d. Pilot Light:
1) Include plate with engraved text, 'ROOF HEATING CABLE’.
2) Quality Standard. See Section 01 6000:
(a) Pass & Seymour 2151 Red.
e. Factory prepared, UL / ULC recognized splice and termination kits by Cable Manufacturer.
f. Controller:
1) Quality Standard. See Section 01 6000:
(a) Chemelex by Raychem PD Pro (no GFEP) for 120V or GF PRO (integral GFEP) for 200-277V.
2. Rain Gutter Heaters:
a. Cable:
1) Quality Standard:
(a) Raychem GM-1X (120 V) or GM-2X (208-277 V).
b. Temperature And Moisture Sensors:
1) Design Standard:
(a) Gutter Sensor: GIT-1 by Raychem.
c. Contactor (if required):
1) Approved Products. See Section 01 6000:
(a) Easy Heat: PC series.
(b) Square 'D': Class 8502.
d. Pilot Light:

1) Include plate with engraved text, 'HEATING CABLE'.
2) Quality Standard:
(a) Pass & Seymour 2151 Red.

e. Factory prepared, UL / ULC recognized splice and termination kits by Cable Manufacturer.

f. Controller:
1) Quality Standard:
(a) Chemelex by Raychem PD Pro (no GFEP) for 120V or GF PRO (integral GFEP) for 200-277V.

PART 3 EXECUTION

3.01 INSTALLATION

A. General:
1. Install electric heating cable not to void Roofing Manufacturer system warranty.
2. Provide materials and labor including engineering if required, to prevent and remedy damage to roof integrity.

B. Rain Gutter And Roof Eave Heaters:
1. Install moisture probes for controller in rain gutter and roof.
2. Install pilot light in corridor or foyer to indicate when cables are operating.
3. Terminate raceway on exterior of building at heat cable location with weatherproof junction box.
4. Install cable using approved spacers and without penetrating rain gutter or roofing material.
5. Install all cable, controllers, sensors and etc. per Manufacturer's written installation instructions.

C. Rain Gutter Heaters:
1. Install moisture probes for controller in rain gutter.
2. Install pilot light in corridor, vestibule or other location as shown on Contract Drawings to indicate when cables are operating.
3. Terminate raceway on exterior of building at heat cable location with weatherproof junction box.
4. Install cable using approved spacers and without penetrating rain gutter.
5. Install electrical heating cable system as per Manufacturer's written installation instructions.

3.02 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Non-Conforming Work: Non-conforming work as covered in the General Conditions applies, but is not limited to the following:
1. Correct any work found defective or not complying with contract document requirements at no additional cost to Owner.
2. Correct any damage to roofing material at no additional cost to Owner.

END OF SECTION 26 0520

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SECTION 26 0526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

1.02 RELATED REQUIREMENTS

A. Section 26 0500 - Common Work Results for Electrical

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2017.

D. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 780 - Standard for the Installation of Lightning Protection Systems 2023.

G. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Verify exact locations of underground metal water service pipe entrances to building.
   2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
   3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

C. Shop Drawings:
   1. Indicate proposed arrangement for signal reference grids. Include locations of items to be bonded and methods of connection.

D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Field quality control test reports.

F. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:
   1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
   2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Bonding and Equipment Grounding:
   1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
   2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
   3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
   4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
   5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
   6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
4. Manufacturers - Mechanical and Compression Connectors:
   a. Advanced Lightning Technology (ALT): www.altfab.com/#sle.
   b. Burndy LLC: www.burndy.com/#sle.
   c. Thomas & Betts Corporation: www.tnb.com/#sle.
   d. Substitutions: See Section 01 6000 - Product Requirements.
5. Manufacturers - Exothermic Welded Connections:
   a. Burndy LLC: www.burndy.com/#sle.
   b. Cadweld, a brand of Erico International Corporation: www.erico.com/#sle.
   c. ThermOweld, subsidiary of Continental Industries; division of Burndy LLC: www.thermoweld.com/#sle.
   d. Substitutions: See Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide grounding bushings on all feeder conduit entrances into panelboards and equipment enclosures.

D. Provide separate insulated grounding conductor from each equipment cabinet to electrical panel. Do not use intermediate connections or splices. Affix directly to cabinet.

E. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

F. Identify grounding and bonding system components in accordance with Section 26 0553.

G. Connect all metallic elements of baptismal font as shown in Contract Drawings. Connect grounding clamps and connector to structural reinforcing bars as per NFPA 70 Article 680 and as shown in Contract Drawings.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 0533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 0533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

C. Section 26 5600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
   2. Coordinate work to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
   4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 03 3000.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel/strut framing systems, nonpenetrating rooftop supports, and post-installed concrete/masonry anchors.

1.06 QUALITY ASSURANCE

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Comply with the following. Where requirements differ, comply with most stringent.
      a. NFPA 70.
      b. Requirements of authorities having jurisdiction.
   2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
   3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
   5. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
   1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
   2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.

D. Metal Channel/Strut Framing Systems:
   1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
   2. Comply with MFMA-4.
   3. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
   4. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
   5. Minimum Channel Dimensions: 1-5/8 inch wide by 13/16 inch high.

E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
   1. Minimum Size, Unless Otherwise Indicated or Required:
      a. Trapeze Support for Multiple Conduits: 3/8-inch diameter.

F. Anchors and Fasteners:
   1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
   2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
   3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
   4. Hollow Masonry: Use toggle bolts.
   5. Hollow Stud Walls: Use toggle bolts.
   6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
   7. Sheet Metal: Use sheet metal screws.
   8. Wood: Use wood screws.
   9. Plastic and lead anchors are not permitted.
   10. Powder-actuated fasteners are not permitted.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install hangers and supports in accordance with NECA 1.

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
   2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Conduit Support and Attachment: See Section 26 0533.13 for additional requirements.

I. Box Support and Attachment: See Section 26 0533.16 for additional requirements.

J. Interior Luminaire Support and Attachment: See Section 26 5100 for additional requirements.

K. Exterior Luminaire Support and Attachment: See Section 26 5600 for additional requirements.

L. Secure fasteners in accordance with manufacturer's recommended torque settings.

M. Remove temporary supports.

3.03 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Inspect support and attachment components for damage and defects.

C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

D. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

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SECTION 26 0533.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Stainless steel rigid metal conduit (RMC).

B. Galvanized steel rigid metal conduit (RMC).

C. Galvanized steel intermediate metal conduit (IMC).

D. Stainless steel intermediate metal conduit (IMC).

E. Flexible metal conduit (FMC).

F. Liquidtight flexible metal conduit (LFMC).

G. Galvanized steel electrical metallic tubing (EMT).

H. Stainless steel electrical metallic tubing (EMT).

I. Rigid polyvinyl chloride (PVC) conduit.

J. Electrical nonmetallic tubing (ENT).

K. Liquidtight flexible nonmetallic conduit (LFNC).

1.02 RELATED REQUIREMENTS

A. Section 26 0500 - Common Work Results for Electrical: Sleeve seals for conduit penetrations.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.
   1. Includes additional requirements for fittings for grounding and bonding.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.

C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.

D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.

F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.

G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

H. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.

I. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.

J. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.

K. NEMA TC 13 - Electrical Nonmetallic Tubing (ENT) 2014 (Reaffirmed 2019).

L. NEMA TC 14 (SERIES) - Reinforced Thermosetting Resin Conduit and Fittings Series 2015.

M. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

N. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.

O. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.

P. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel Current Edition, Including All Revisions.

Q. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.

R. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.

S. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

T. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel Current Edition, Including All Revisions.

U. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

V. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

W. UL 1653 - Electrical Nonmetallic Tubing Current Edition, Including All Revisions.

X. UL 1660 - Liquid-Tight Flexible Nonmetallic Conduit Current Edition, Including All Revisions.

Y. UL 2419 - Outline of Investigation for Electrically Conductive Corrosion Resistant Compounds Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
   2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
   3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
   4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
   5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

C. Shop Drawings:
   1. Include proposed locations of roof penetrations and proposed methods for sealing.

D. Project Record Documents: Record actual routing for conduits installed underground, conduits embedded within concrete slabs, and conduits 2-inch (53 mm) trade size and larger.

1.06 QUALITY ASSURANCE

A. Product Listing Organization Qualifications: Organization recognized by OSHA as Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most

restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.

C. Concealed Within Masonry Walls: Use intermediate metal conduit (IMC).

D. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT) or Electrical non-metallic tubing (ENT).

E. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT) or Electrical non-metallic tubing (ENT).

F. Interior, Damp or Wet Locations: Use intermediate metal conduit (IMC).

G. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

H. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
   1. Locations subject to physical damage include, but are not limited to:
      a. Where exposed below 8 feet, except within electrical and communication rooms or closets.

I. Exposed, Exterior: Use galvanized steel rigid metal conduit or intermediate metal conduit (IMC).

J. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

K. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit or liquid tight flexible non-metallic conduit (LFNC).
   1. Maximum Length: 6 feet.

L. Flexible Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit (FMC).
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
   3. Maximum Length: 3 feet unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Transformers.
      b. Motors.

M. Fished in Existing Walls, Where Necessary: Use flexible metal conduit (FMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).

2.02 CONDUIT - GENERAL REQUIREMENTS

A. Comply with NFPA 70.

B. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling mandrel through them.

C. Fittings for Grounding and Bonding: See Section 26 0526 for additional requirements.

D. Provide conduit, fittings, supports, and accessories required for complete raceway system.

E. Provide products listed, classified, and labeled as suitable for purpose intended.

F. Minimum Conduit Size, Unless Otherwise Indicated:
   1. For exterior use: 3/4 inch (21 mm)
   2. For interior use: 1/2 inch (16 mm)

G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
   1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.

2. Nucor Tubular Products: www.nucortubular.com/#sle.
3. Wheatland Tube, a division of Zekelman Industries: www.wheatland.com/#sle.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com/#sle.
b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
2. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
3. Material: Use steel or malleable iron.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.

B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
4. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
1. Allied Tube & Conduit, a division of Atkore International: www.alliedeg.com/#sle.
2. Nucor Tubular Products: www.nucortubular.com/#sle.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.06 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

B. Fittings:
1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.

2.07 FLEXIBLE METAL CONDUIT (FMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.

B. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.

C. Fittings:
1. Manufacturers:

a. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.

2.08 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:
1. AFC Cable Systems, Inc: www.afcweb.com.
2. Electri-Flex Company: www.electriflex.com.
3. International Metal Hose: www.metalhose.com.

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

2.09 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit: www.alliedeg.com.
2. Nucor Tubular Products: www.nucortubular/#sle.
3. Wheatland Tube Company: www.wheatland.com.

B. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings, LLC: www.bptfittings.com/#sle.
b. Emerson Electric Co; O-Z/Gedney: www.emerson.com/#sle.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.
a. Do not use die cast zinc fittings.
4. Connectors and Couplings: Use compression (gland) or set-screw type.
a. Do not use indenter type connectors and couplings.
5. Damp or Wet Locations, Where Permitted: Use fittings listed for use in wet locations.

2.10 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.

B. Fittings:
1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Connectors and Couplings: Use compression/gland or set-screw type.
3. Embedded Within Concrete, Where Permitted: Use fittings listed as concrete-tight. Fittings that require taping to be concrete-tight are acceptable.

2.11 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Manufacturers:
1. Cantex Inc: www.cantexinc.com/#sle.

2. JM Eagle: www.jmeagle.com/#sle.

B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

C. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.12 ELECTRICAL NONMETALLIC TUBING (ENT)

A. Manufacturers:
1. Cantex Inc: www.cantexinc.com/#sle.

B. Description: NFPA 70, Type ENT electrical nonmetallic tubing complying with NEMA TC 13 and listed and labeled as complying with UL 1653.

C. Fittings:
1. Manufacturer: Same as manufacturer of ENT to be connected.
2. Use solvent-welded type fittings.
3. Solvent-Welded Fittings: Rigid PVC fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; suitable for use with ENT.

2.13 LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT (LFNC)

A. Manufacturers:
1. AFC Cable Systems, a division of Atkore International: www.afcweb.com/#sle.
2. Electri-Flex Company: www.electriflex.com/#sle.
3. IPEX, a division of Aliaxis: www.ipexna.com/#sle.

B. Description: NFPA 70, Type LFNC liquidtight flexible nonmetallic conduit listed and labeled as complying with UL 1660.

C. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B; suitable for type of conduit to be connected.

2.14 PROHIBITED FITTING MATERIALS

A. The following fitting type are not permitted: crimp-on, tap-on, indenter, and cast set-screw fittings for EMT.

B. Spray (aerosol) PVC cement.

2.15 ACCESSORIES

A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil, 0.020 inch.

B. Conduit Joint Compound: Corrosion-resistant, electrically conductive compound listed as complying with UL 2419; suitable for use with conduit to be installed.

C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
1. Spray (aerosol) PVC cement is not permitted.

D. Pull Strings: Use nylon or polyester tape with average breaking strength of not less than 1,250 lbf.

E. Sealing Compound for Hazardous/Classified Location Sealing Fittings: Listed for use with particular fittings to be installed.

F. Expansion Fittings: Designed to allow for expansion and contraction in a run of conduit, suitable for type of conduit installed.
1. Products:

a. Hot Dip Galvanized: O-Z/Gedney (Emerson) type AX.
b. PVC: Carlon type E945.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.
B. Verify that mounting surfaces are ready to receive conduits.
C. Verify that conditions are satisfactory for installation prior to starting work.
D. Notify Architect in writing if substrates are not acceptable to install raceways and boxes.
   1. Commencing installation constitutes acceptance of existing conditions.

3.02 INSTALLATION

A. Furnish and install air-vapor barrier boxes, electric service raceways, telephone service raceways, and internet service raceways as described in the contract documents.
   1. Install raceways for building services in accordance with service providers requirements.
B. Install Owner provided corner A/V equipment cabinets.
C. Install products in accordance with manufacturer's instructions.
D. Install conduit in accordance with NECA 1.
E. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
F. Install intermediate metal conduit (IMC) in accordance with NECA 101.
G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
H. Install electrical nonmetallic tubing (ENT) in accordance with NECA 111.
I. Install liquidtight flexible nonmetallic conduit (LFNC) in accordance with NECA 111.
J. Conduit Routing:
   1. Unless dimensioned, conduit routing indicated is diagrammatic.
   2. When conduit destination is indicated without specific routing, determine exact routing required.
   3. Conceal conduits unless specifically indicated to be exposed.
   4. Conduits in the following areas may be exposed, unless otherwise indicated:
      a. Electrical rooms.
      b. Mechanical equipment rooms.
      c. Within joists in areas with no ceiling.
   5. Unless otherwise approved, do not route exposed conduits:
      a. Across floors.
      b. Across roofs.
      c. Across top of parapet walls.
      d. Across building exterior surfaces.
   6. Conduits installed underground or embedded in concrete may be routed in shortest possible manner unless otherwise indicated. Route other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
   7. Arrange conduit to maintain adequate headroom, clearances, and access.
   8. Arrange conduit to provide no more than equivalent of four 90-degree bends between pull points.
   9. Arrange conduit to provide no more than 150 feet between pull points.
   10. Route conduits above water and drain piping where possible.
   11. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
   12. Maintain minimum clearance of 6 inches between conduits and piping for other systems.

13. Maintain minimum clearance of 12 inches between conduits and hot surfaces. This includes, but is not limited to:
    a. Heaters.
    b. Hot water piping.
    c. Flues.
14. Group parallel conduits in same area on common rack.

K. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 26 0529.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use metal channel/strut with accessory conduit clamps to support multiple parallel surface-mounted conduits.
5. Use conduit clamp to support single conduit from beam clamp or threaded rod.
6. Use trapeze hangers assembled from threaded rods and metal channel/strut with accessory conduit clamps to support multiple parallel suspended conduits.
7. Use of wire for support of conduits is not permitted.
8. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with most stringent requirements.

L. Connections and Terminations:
1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
6. Where spare conduits stub up through concrete floors and are not terminated in box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
7. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
8. Secure joints and connections to provide mechanical strength and electrical continuity.
9. Provide PVC adapters at all boxes.

M. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Provide suitable sealing system where conduits penetrate exterior wall below grade.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.

8. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 07 8400.

N. Installation in concrete:
1. Install no conduit in concrete unless outside diameter is less than 1/3 of slab, wall, or beam thickness in which it is embedded.
2. Position conduits in center of concrete below reinforcing steel, and separated by minimum lateral spacing of three diameters.
3. Elbows embedded in concrete shall be rigid steel or IMC and stubouts from concrete slabs shall extend 3 inches (75 mm) minimum before making connection to EMT.
4. Separate conduits penetrating structural slabs in buildings by 2 inches (50 mm) minimum.
5. Install seal device where underground raceways penetrate concrete building wall.

O. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

P. Conduit Sealing:
1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:
a. Where conduits enter building from outside.
b. Where service conduits enter building from underground distribution system.
c. Where conduits enter building from underground.
d. Where conduits may transport moisture to contact live parts.
2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
a. Where conduits pass from outdoors into conditioned interior spaces.
b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

Q. Provide pull string in each empty conduit and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.

R. Provide grounding and bonding; see Section 26 0526.

S. Identify conduits; see Section 26 0553.

3.03 PROHIBITED PROCEDURES

A. Installation of raceway beneath or embedded in concrete, except where explicitly shown on Contract Documents.

B. Use of wooden plugs inserted in concrete or masonry units for mounting raceway, supports, boxes, cabinets, or other equipment.

C. Installation of raceway that has been crushed or deformed.

D. Use of torches for bending PVC.

E. Spray applied PVC cement.

F. Boring holes in truss members.

G. Notching of structural members.

H. Supporting raceway from ceiling system support wires.

I. Nail drive straps or tie wire for supporting raceway.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for additional requirements.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective conduits.

3.05 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.06 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

END OF SECTION

SECTION 26 0533.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

C. Boxes and enclosures for integrated power, data, and audio/video.

D. Floor boxes.

1.02 RELATED REQUIREMENTS

A. Section 26 0526 - Grounding and Bonding for Electrical Systems.

B. Section 26 0529 - Hangers and Supports for Electrical Systems.

C. Section 26 0533.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.
   2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

C. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.

J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
   2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
   3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
   4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
   5. Coordinate the work with other trades to preserve insulation integrity.
   6. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.

7. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures and floor boxes.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Keys for Lockable Enclosures: Two of each different key.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

D. Firms regularly engaged in manufacturing of boxes for electrical systems of type and size required, whose products have been in satisfactory use in similar service for not less than ten (10) years.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:
   1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
   2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
   3. Provide products listed, classified, and labeled as suitable for the purpose intended.
   4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
   5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
   1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
   2. Use cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
   3. Use suitable concrete type boxes where flush-mounted in concrete.
   4. Use suitable masonry type boxes where flush-mounted in masonry walls.
   5. Use raised covers suitable for the type of wall construction and device configuration where required.
   6. Use shallow boxes where required by the type of wall construction.
   7. Do not use "through-wall" boxes designed for access from both sides of wall.

8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Minimum Box Size, Unless Otherwise Indicated:
    a. Wiring Devices 4 inch square by 2-1/8 inch deep (100 by 54 mm) trade size.: 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
    b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
13. Wall Plates: Comply with Section 26 2726.
14. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hubbell Incorporated; Bell Products: www.hubbell-rtb.com/#sle.
    c. Hubbell Incorporated; RACO Products: www.hubbell-rtb.com/#sle.
    d. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com/#sle.
    e. Thomas & Betts Corporation: www.tnb.com/#sle.

C. Vapor-Tight Boxes:
1. Premolded polyethylene box installed in all exterior framing walls (thermal envelope) around recessed outlet boxes.
2. Approved Manufacturers:
    a. Lessco Low energy Systems Supply Company, Inc. Campbellsport, WI www.lessco-airtight.com

D. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    a. Indoor Clean, Dry Locations: Type 1, painted steel.
    b. Outdoor Locations: Type 3R, painted steel.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
    a. Provide hinged-cover enclosures unless otherwise indicated.
    b. Boxes 6 square feet and Larger: Provide hinged-cover enclosures.
4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    b. Back Panels: Painted steel, removable.
5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
6. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com/#sle.
    b. Hoffman, a brand of Pentair Technical Products: www.hoffmanonline.com/#sle.
    c. Hubbell Incorporated; Wiegmann Products: www.hubbell-wiegmann.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive boxes.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

E. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

F. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.

G. Provide vapor-tight boxes where indicated in the contract documents.
   1. Carefully cut above grade vapor barrier and seal around recessed outlet boxes to minimize air infiltration.

H. Box Locations:
   1. Locate boxes to be accessible. Provide access panels in accordance with Section 08 3100 as required where approved by the Architect.
   2. Unless dimensioned, box locations indicated are approximate.
   3. Locate boxes as required for devices installed under other sections or by others.
      a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 2726.
   4. Locate boxes so that wall plates do not span different building finishes.
   5. Locate boxes so that wall plates do not cross masonry joints.
   6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
   7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches horizontal separation unless otherwise indicated.
   8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches horizontal separation.
   9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
      a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
      b. Do not install flush-mounted boxes with area larger than 16 square inches or such that the total aggregate area of openings exceeds 100 square inches for any 100 square feet of wall area.
   10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 0533.13.
   11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:
      a. Concealed above accessible suspended ceilings.
      b. Within joists in areas with no ceiling.
      c. Electrical rooms.
      d. Mechanical equipment rooms.

I. Box Mounting Heights:
   1. Electrical:
      a. Receptacles: 18 inches.
      b. Wall Switches: 42 inches.
      c. Wall-Mounted Exit Lights: 90 inches.
      d. Emergency Lighting Units: 60 inches.

e. Sound Distribution System Components: As indicated on Drawings.
f. Satellite Distribution System Components: As indicated on Drawings.
g. TV Distribution System Components: As indicated on Drawings.
h. Computer and TV: 18 inches.
i. Telephones (wall type): 60 inches.
j. Telephones (desk type): 18 inches.
k. Telephone / Data (desk type): 18 inches.
l. Data (desk type): 18 inches.
m. Signal Chimes: 84 inches.
n. Refer to other sections for mounting heights of electrical equipment not listed above.

J. Box Supports:
1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.

K. Install boxes plumb and level.

L. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

M. Install boxes as required to preserve insulation integrity.

N. Metallic Floor Boxes: Install box level at the proper elevation to be flush with finished floor.
1. Furnish and install inset material to match the floor finish.

O. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

Q. Close unused box openings.

R. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

S. Provide grounding and bonding in accordance with Section 26 0526.

T. Identify boxes in accordance with Section 26 0553.

3.03 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.04 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

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SECTION 26 0583
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 RELATED REQUIREMENTS

A. Section 26 0519 - Low-Voltage Electrical Power Conductors and Cables.

B. Section 26 0533.13 - Conduit for Electrical Systems.

C. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
   2. Determine connection locations and requirements.

B. Sequencing:
   1. Install rough-in of electrical connections before installation of equipment is required.
   2. Make electrical connections before required start-up of equipment.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

1.06 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
   1. Colors: Comply with NEMA WD 1.
   2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
   3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.02 EQUIPMENT CONNECTIONS

A. Electric ranges:
   1. Electrical Connection: Cord (4-wire, grounding) and plug (NEMA 14-50P). 48 inch minimum cord length.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 26 5600
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Ballasts.

C. Luminaire accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.

B. Section 26 0500 - Common Work Results for Electrical.

C. Section 26 0526 - Grounding and Bonding for Electrical Systems.

D. Section 26 0529 - Hangers and Supports for Electrical Systems.

E. Section 26 0533.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals; 2013, with Editorial Revision (2025).

C. ANSI C82.4 - American National Standard for Lamp Ballasts - Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps; 2017.

D. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2017.

E. ANSI O5.1 - American National Standard for Wood Poles: Specifications and Dimensions; 2022.

F. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 2013 (Corrigendum 2019).

G. IEEE C2 - National Electrical Safety Code(R) (NESC(R)); 2023.

H. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).

I. IES LM-63 - Approved Method: IES Standard File Format for the Electronic Transfer of Photometric Data and Related Information; 2019.

J. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2019.

K. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.

L. IES RP-8 - Recommended Practice: Lighting Roadway and Parking Facilities; 2021.

M. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

N. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2000 (Reaffirmed 2006).

O. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Disharge Ballasts; 2020.

P. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

Q. UL 1598 - Luminaires; Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings:

C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
   1. LED Luminaires:
      a. Include estimated useful life, calculated based on IES LM-80 test data.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Closeout Submittals:
   1. Include following in Operations And Maintenance Manual specified in Section 01 7800:
      a. Manufacturer's maintenance instructions: Provide operating instructions for following components of exterior lighting control systems. Include one copy in Operations and Maintenance Manual and deliver two additional copies at time of Owner's instruction.
         1) Photocells.
         2) Time Switches.
         3) Lighting Contactors.

PART 2 PRODUCTS

2.01 LUMINAIRES

A. Materials:
   1. Exterior Fixtures:
      a. Finish shall be high quality polyester powder coating:
         1) Finish process shall consist of cleaning, electrostatically applying power coat, and thermal curing.
         2) Weather, scratch, UV, and fade resistant.
      b. Color shall be Manufacturer's standard as selected by Architect.
      c. Acceptable Products:
         1) As indicated on Fixture Schedule. Do not mix fixtures from different manufacturers for one use.
         2) Equals as approved by Architect before bidding. See Section 01 6200.

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

2.02 EMERGENCY POWER SUPPLY UNITS

A. Manufacturers:
   1. Beghelli, Miramar, FL www.beghelliusa.com.
   2. Dual-Lite, Cheshire, CT www.dual-lite.com.
   3. Iota Engineering, LLC: www.iotaengineering.com/#sle.
   4. Lithonia Lighting: www.lithonia.com/#sle.
   5. Signify Emergency Lighting/Bodine: www.bodine.com/#sle.
   6. Eaton-Cooper Industries/Sure-Lites; www.cooperlighting.com
   7. McPhilben / Day-Brite Lighting, Tupelo, MS www.mcphilben.com.
   8. Substitutions: See Section 01 6000 - Product Requirements.
   9. Manufacturer Limitations: Where possible, for each type of luminaire provide emergency power supply units produced by a single manufacturer.

B. Description: Self-contained emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

C. Compatibility:
   1. Drivers: Compatible with electronic, standard magnetic, energy saving, and dimming AC drivers, including those with end of lamp life shutdown circuits.

D. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamp(s) to the emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

E. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.

F. Factory installed in lighting fixture, or field installed to same standards. Components shall be fully concealed and easily accessible for maintenance or replacement.
   1. Install in ballast channel of fixture with charging indicator light and test switch mounted on fixture end, or visible and accessible through lens.

G. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

H. Accessories:
   1. Provide compatible accessory remote combination test switch/indicator light where indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 0533.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires in accordance with NECA/IESNA 501.

E. Provide required support and attachment in accordance with Section 26 0529.

F. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Interface With Other Work:
   1. Coordinate location of anchor bolts and conduit in concrete bases so pole will be properly mounted and centered on base.

J. Emergency Power Supply Units:
   1. For field-installed units, install inside luminaire unless otherwise indicated. Where installation inside luminaire is not possible, install on top of luminaire.
   2. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal ballast(s) in luminaire. Bypass local switches, contactors, or other lighting controls.
   3. Install lock-on device on branch circuit breaker serving units.
   4. Wire so unit can be tested with lights on.
   5. Wire so lamps in normal mode are switched off with other lighting in area. Connect unit to unswitched conductor of normal lighting circuit.

3.02 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

B. See Section 01 7900 - Demonstration and Training, for additional requirements.

C. Instruction Of Owner:
   1. Before Substantial Completion, meet with personnel designated by Owner to:
      a. Identify location of control system components.
      b. Explain operation of each component.
      c. Demonstrate adjustment capabilities of time clocks, including turning systems OFF at times other than sunrise and keeping systems OFF on days facility is closed.
      d. Set time clocks as directed.

END OF SECTION 26 5600