



CALIFORNIA CONSTRUCTION AUTHORITY

BID ADDENDUM NO. 2

To: All Bidders

From: CCA, 1776 Tribute Road, Suite 220, Sacramento, CA 95815

Date: November 21, 2025

Subject: **Campground Restroom
OC Fair & Event Center
CCA Project No. 032-23-521745**

Please note the following clarification, changes and/or additions/deletions to the Plans and Specifications for the above subject project at the **OC Fair & Event Center** (Fair). All work shall be installed complete and operational, and comply with all applicable local, State, and Federal building codes and regulations. Items in this Addendum override and take precedent over originally issued plans, specifications, and scope of work. Acknowledge receipt of this Addendum in the space provided on the Bid Form.

The following is a list of addendum items clarified during the proposals process:

- Provided below are the Enhanced Worker Safety Policy, along with an example letter, and the project specifications for the Campground Restroom project at the OC Fair & Event Center. All other aspects of the project remain unchanged.

If you have any questions or need additional information, please contact Dante Medina at CCA (949.815.1864) or dmedina@ccauthority.org.

End of Addendum No. 2

32nd District Agricultural Association
Board Policies

Board Policy 6.07: Enhanced Worker Safety Policy

Date Adopted/Last Revised: January 28, 2021

Note: Capitalized terms not otherwise defined in this Board Policy have the meanings set forth in the Definitions section of Board Policy 1.01. Should any provision in this policy contradict any provision of California law, California law shall control.

Purpose

For all construction projects with a contract price in excess of Twenty Five Thousand Dollars (\$25,000), the following Enhanced Worker Safety Policy (EWSP) shall be included as part of the contract document:

Policy

The EWSP will be monitored by the construction management team at the construction site by collecting daily job manpower reports. These reports shall contain specific information on trades, personnel, and equipment engaged on the project site on a daily basis. The required workforce ratios shall be determined by verifying the workforce on a daily basis.

The 32nd DAA has adopted California Public Contract Code Chapter 2.9 – Skilled and Trained Workforce Requirements [2600-2603] as its policy for construction projects with a contract price in excess of \$25,000.

Public Contract Code Chapter 2.9 – Skilled and Trained Workforce Requirements [2600-2603] is as follows:

CHAPTER 2.9. Skilled and Trained Workforce Requirements [2600 - 2603]

2600:

(a) This chapter applies when a public entity is required by statute or regulation to obtain an enforceable commitment that a bidder, contractor, or other entity will use a skilled and trained workforce to complete a contract or project.

(b) A public entity may require a bidder, contractor, or other entity to use a skilled and trained workforce to complete a contract or project regardless of whether the public entity is required to do so by a statute or regulation.

(c) When the use of a skilled and trained workforce to complete a contract or project is required pursuant to subdivision (a) or (b), the public entity shall include in all bid documents and construction contracts a notice that the project is subject to the skilled and trained workforce requirement.

(Amended by Stats. 2020, Ch. 347, Sec. 1. (AB 2311) Effective January 1, 2021.)

2600.5:

The failure of a public entity to provide a notice pursuant to subdivision (c) of Section 2600 shall not excuse either of the following:

(a) The public entity from the requirement to obtain an enforceable commitment that a bidder, contractor, or other entity will use a skilled and trained workforce to complete a contract or project.

(b) A bidder, contractor, or other entity from the obligation to use a skilled or trained workforce if such a requirement is imposed by a statute or regulation.

(Added by Stats. 2020, Ch. 347, Sec. 2. (AB 2311) Effective January 1, 2021.)

2601:

For purposes of this chapter:

(a) “Apprenticeable occupation” means an occupation for which the Chief of the Division of Apprenticeship Standards of the Department of Industrial Relations had approved an apprenticeship program pursuant to Section 3075 of the Labor Code before January 1, 2014.

(b) “Chief” means the Chief of the Division of Apprenticeship Standards of the Department of Industrial Relations.

(c) “Graduate of an apprenticeship program” means either of the following:

(1) An individual that has been issued a certificate of completion under the authority of the California Apprenticeship Council for completing an apprenticeship program approved by the chief pursuant to Section 3075 of the Labor Code.

(2) An individual that has completed an apprenticeship program located outside California and approved for federal purposes pursuant to the apprenticeship regulations adopted by the federal Secretary of Labor.

(d) “Skilled and trained workforce” means a workforce that meets all of the following conditions:

(1) All the workers performing work in an apprenticeable occupation in the building and construction trades are either skilled journeypersons or apprentices registered in an apprenticeship program approved by the chief.

(2) (A) For work performed on or after January 1, 2017, at least 30 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation. This requirement shall not apply to work performed in the occupation of teamster.

(B) For work performed on or after January 1, 2018, at least 40 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation, except that the requirements of subparagraph (A) shall continue to apply to work performed in the following occupations: acoustical installer, bricklayer, carpenter, cement mason, drywall installer or lather, marble mason, finisher, or setter, modular furniture or systems installer, operating engineer, pile driver, plasterer, roofer or waterproofer, stone mason, surveyor, teamster, terrazzo worker or finisher, and tile layer, setter, or finisher.

(C) For work performed on or after January 1, 2019, at least 50 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation, except that the requirements of subparagraph (A) shall continue to apply to work performed in the following occupations: acoustical installer, bricklayer, carpenter, cement mason, drywall installer or lather, marble mason, finisher, or setter, modular furniture or systems installer, operating engineer, pile driver, plasterer, roofer or waterproofer, stone mason, surveyor, teamster, terrazzo worker or finisher, and tile layer, setter, or finisher.

(D) For work performed on or after January 1, 2020, at least 60 percent of the skilled journeypersons employed to perform work on the contract or project by every contractor and each of its subcontractors at every tier are graduates of an apprenticeship program for the applicable occupation, except that the requirements of subparagraph (A) shall continue to apply to work performed in the following occupations: acoustical installer, bricklayer, carpenter, cement mason, drywall installer or lather, marble mason, finisher, or setter, modular furniture or

systems installer, operating engineer, pile driver, plasterer, roofer or waterproofer, stone mason, surveyor, teamster, terrazzo worker or finisher, and tile layer, setter, or finisher.

(3) For an apprenticeable occupation in which no apprenticeship program had been approved by the chief before January 1, 1995, up to one-half of the graduation percentage requirements of paragraph (2) may be satisfied by skilled journeypersons who commenced working in the apprenticeable occupation before the chief's approval of an apprenticeship program for that occupation in the county in which the project is located.

(4) The apprenticeship graduation percentage requirements of paragraph (2) are satisfied if, in a particular calendar month, either of the following is true:

(A) At least the required percentage of the skilled journeypersons employed by the contractor or subcontractor to perform work on the contract or project meet the graduation percentage requirement.

(B) For the hours of work performed by skilled journeypersons employed by the contractor or subcontractor on the contract or project, the percentage of hours performed by skilled journeypersons who met the graduation requirement is at least equal to the required graduation percentage.

(5) The contractor or subcontractor need not meet the apprenticeship graduation requirements of paragraph (2) if, during the calendar month, the contractor or subcontractor employs skilled journeypersons to perform fewer than 10 hours of work on the contract or project.

(6) A subcontractor need not meet the apprenticeship graduation requirements of paragraph (2) if both of the following requirements are met:

(A) The subcontractor was not a listed subcontractor under Section 4104 or a substitute for a listed subcontractor.

(B) The subcontract does not exceed one-half of 1 percent of the price of the prime contract.

(e) "Skilled journeyman" means a worker who either:

(1) Graduated from an apprenticeship program for the applicable occupation that was approved by the chief or located outside California and approved for federal purposes pursuant to the apprenticeship regulations adopted by the federal Secretary of Labor.

(2) Has at least as many hours of on-the-job experience in the applicable occupation as would be required to graduate from an apprenticeship program for the applicable occupation that is approved by the chief.

(Amended by Stats. 2018, Ch. 882, Sec. 1. (AB 3018) Effective January 1, 2019.)

2602:

(a) When a contractor, bidder, or other entity is required to provide an enforceable commitment that a skilled and trained workforce will be used to complete a contract or project, the commitment shall be made in an enforceable agreement with the public entity or other awarding body that provides both of the following:

(1) The contractor, bidder, or other entity, and its contractors and subcontractors at every tier, will comply with this chapter.

(2) The contractor, bidder, or other entity will provide to the public entity or other awarding body, on a monthly basis while the project or contract is being performed, a report demonstrating compliance with this chapter.

(b) If the contractor, bidder, or other entity fails to provide the monthly report required by this section, or provides a report that is incomplete, the public agency or other awarding body shall withhold further payments until a complete report is provided. If a monthly report is incomplete due to the failure of a subcontractor to timely submit the required information to the contractor, bidder, or other entity, the public agency or awarding body shall only withhold an amount equal to 150 percent of the value of the monthly billing for the relevant subcontractor. If a public agency or other awarding body withholds amounts pursuant to this subdivision, the contractor, bidder, or other entity shall be entitled to withhold the same amount from the subcontractor until the subcontractor provides the contractor, bidder, or other entity a complete report, and the public agency or awarding body subsequently pays the contractor, bidder, or other entity the withheld payments. If the contractor, bidder, or other entity substitutes a subcontractor pursuant to Chapter 4 (commencing with Section 4100) for failure to provide a complete report, and the contractor, bidder, or other entity replaces the subcontractor with one that provides an enforceable commitment that a skilled and trained workforce will be used to complete the contract or project, the public agency or awarding body shall immediately resume making payments to the contractor, bidder, or other entity, including all previously withheld payments.

(c) If a monthly report does not demonstrate compliance with this chapter, the public agency or other awarding body shall do all of the following:

(1) Withhold further payments until the contractor, bidder, or other entity provides a plan to achieve substantial compliance with this chapter, with respect to the relevant apprenticeable occupation, prior to completion of the contract or project. All of the following shall apply to the withholding of payments under this paragraph:

(A) The public agency or awarding body shall withhold an amount equal to 150 percent of the value of the monthly billing for the entity that failed to comply with this chapter, or 150 percent of the value of the monthly billing for the subcontractor that failed to comply with this chapter. If a public agency or other awarding body withholds amounts pursuant to this paragraph, the contractor, bidder, or other entity shall be entitled to withhold the same amount from the subcontractor that did not demonstrate compliance with this chapter.

(B) If the contractor, bidder, or other entity substitutes a subcontractor pursuant to Chapter 4 (commencing with Section 4100) for failure to demonstrate compliance, and the contractor, bidder, or other entity replaces the subcontractor with one that provides an enforceable commitment that a skilled and trained workforce will be used to complete the contract or project, the public agency or awarding body shall immediately resume making payments to the contractor, bidder, or other entity, including all previously withheld payments.

(C) If a contractor, bidder, or other entity submits to the public agency or awarding body a plan to achieve substantial compliance with this chapter, the public agency or awarding body shall immediately resume making payments to the contractor, bidder, or other entity, including all previously withheld payments unless, within a reasonable time, the public agency or awarding body rejects the plan as insufficient and explains the reasons for the rejection.

(2) Forward a copy of the monthly report to the Labor Commissioner for issuance of a civil wage and penalty assessment in accordance with Section 2603.

(3) Forward to the Labor Commissioner a copy of the plan, if any, submitted by the contractor, bidder, or other entity to achieve substantial compliance with this chapter and the response to that plan, if any, by the public agency or awarding body.

(d) A monthly report provided to the public agency or other awarding body shall be a public record under the California Public Records Act (Chapter 3.5 (commencing with Section 6250) of Division 7 of Title 1 of the Government Code) and shall be open to public inspection.

(Amended by Stats. 2018, Ch. 882, Sec. 2. (AB 3018) Effective January 1, 2019.)

2603:

(a) If the Labor Commissioner or his or her designee determines after an investigation that a contractor or subcontractor failed to use a skilled and trained workforce in accordance with this chapter, the contractor or subcontractor responsible for the violation shall forfeit, as a civil penalty to the state, not more than five thousand dollars (\$5,000) per month of work performed in violation of this chapter. A contractor or subcontractor that commits a second or subsequent violation within a three-year period shall forfeit as a civil penalty to the state the sum of not more than ten thousand dollars (\$10,000) per month of work performed in violation of this chapter.

(b) For the purposes of this section:

(1) “Any interest” shall have the same meaning as in subdivision (h) of Section 1777.1 of the Labor Code.

(2) “Contractor or subcontractor” shall have the same meaning as in subdivision (g) of Section 1777.1 of the Labor Code.

(3) “Entity” shall have the same meaning as in subdivision (i) of Section 1777.1 of the Labor Code.

(c) The amount of any monetary penalty may be reduced or waived by the Labor Commissioner if the amount of the penalty would be disproportionate to the severity of the violation. The Labor Commissioner shall consider, in setting the amount of a monetary penalty, all of the following circumstances:

(1) Whether the violation was intentional.

(2) Whether the contractor or subcontractor has committed other violations of this chapter or of the Labor Code.

(3) Whether, upon notice of the violation, the contractor or subcontractor took steps to voluntarily remedy the violation.

(4) The extent or severity of the violation.

(5) Whether a contractor or subcontractor submitted and followed a plan to achieve substantial compliance with this chapter.

(d) The Labor Commissioner or his or her designee shall issue a civil wage and penalty assessment, in accordance with the provisions of Section 1741 of the Labor Code, upon determination of penalties assessed under subdivision (a). Review of a civil wage and penalty assessment issued under this subdivision may be requested in accordance with the provisions of Section 1742 of the Labor Code. The regulations of the Director of Industrial Relations, which govern proceedings for review of civil wage and penalty assessments and the withholding of contract payments under Article 1 (commencing with Section 1720) and Article 2 (commencing with Section 1770) of Chapter 1 of Part 7 of Division 2 of the Labor Code, shall apply.

(e) The determination of the Labor Commissioner as to the amount of the penalty imposed under subdivision (a) shall be reviewable by the Director of Industrial Relations only for an abuse of discretion.

(f) If a subcontractor is found to have violated this chapter, the prime contractor of the project is not liable for any penalties under subdivision (a) unless the prime contractor had knowledge of the subcontractor's failure to comply with this chapter or unless the prime contractor fails to comply with any of the following requirements:

(1) For contracts entered into on or after January 1, 2019, the contract executed between the contractor and the subcontractor for the performance of work on the project shall include a copy of this chapter.

(2) The contractor shall periodically monitor the subcontractor's use of a skilled and trained workforce.

(3) Upon becoming aware of a failure of the subcontractor to use a skilled and trained workforce, the contractor shall take corrective action, including, but not limited to, retaining 150 percent of the amount due to the subcontractor for work performed on the project until the failure is corrected.

(4) Prior to making the final payment to the subcontractor for work performed on the project, the contractor shall obtain a declaration signed under penalty of perjury from the subcontractor that the subcontractor has met the requirements of this chapter.

(g) The Labor Commissioner shall notify the prime contractor within 15 days of the receipt by the Labor Commissioner of a complaint that a subcontractor violated this chapter.

(h) Whenever a contractor or subcontractor is found by the Labor Commissioner to be in violation of this chapter with intent to defraud, the contractor or subcontractor or a firm, corporation, partnership, or association in which the contractor or subcontractor has any interest is ineligible for a period of not less than one year or more than three years to do either of the following:

(1) Bid on or be awarded a contract for a public works project.

(2) Perform work as a subcontractor on a public works project.

(i) Whenever a contractor or subcontractor is found by the Labor Commissioner to have committed two or more separate willful violations of this chapter within a three-year period, the contractor or subcontractor or a firm, corporation, partnership, or association in which the contractor or subcontractor has any interest is ineligible for a period of up to three years to do either of the following:

(1) Bid on or be awarded a contract for a public works project.

(2) Perform work as a subcontractor on a public works project.

(j) The debarment procedures adopted by the Labor Commissioner pursuant to Section 1777.1 of the Labor Code shall apply to any finding made under subdivisions (h) or (i) of this section.

(k) The Labor Commissioner shall publish on the commissioner's Internet Web site a list of contractors who are ineligible to bid on or be awarded a public works contract, or to perform work as a subcontractor on a public works project pursuant to this section. The list shall contain the name of the contractor, the Contractors' State License Board license number of the contractor, and the effective period of debarment of the contractor. Contractors shall be added to the list upon issuance of a debarment order and the commissioner shall also notify the Contractors' State License Board when the list is updated. At least annually, the commissioner shall notify awarding bodies of the availability of the list of debarred contractors.

(l) (1) If a public entity or awarding body that is required to obtain an enforceable commitment that a skilled and trained workforce will be used to complete a contract or project receives a monthly report which does not demonstrate compliance with the skilled and trained workforce requirements of subdivision (c) of Section 10506.6, Section 10506.8, Section 10506.9, or subdivision (c) of Section 20928.2 of this code, Article 9 (commencing with Section 388) of Chapter 2.3 of Part 1 of Division 1 of the Public Utilities Code, or subparagraph (B) of paragraph (8) of subdivision (a) of Section 65913.4 or subparagraph (B) of paragraph (4) of subdivision (f) of Section 66201 of the Government Code, the public entity or awarding body shall forward a copy of the monthly report to the Labor Commissioner for issuance of a civil wage and penalty assessment in accordance with this section.

(2) The penalty and debarment procedures of this section shall apply to violations of subdivision (c) of Section 10506.6, Section 10506.8, Section 10506.9, or subdivision (c) of Section 20928.2 of this code, Article 9 (commencing with Section 388) of Chapter 2.3 of Part 1 of Division 1 of the Public Utilities Code, or subparagraph (B) of paragraph (8) of subdivision (a) of Section 65913.4 or subparagraph (B) of paragraph (4) of subdivision (f) of Section 66201 of the Government Code.

(Added by Stats. 2018, Ch. 882, Sec. 3. (AB 3018) Effective January 1, 2019.)



August 6, 2024

To Whom it may concern:

Re: Enhanced Worker Safety Policy Employee List Adding Eliser Medina

The following employees meet or exceed the 4yrs. Experience, meeting The Enhanced Worker Program Requirements.

Employees have at least as many hours of on-the-job experience in the applicable occupation as would be required to graduate from an apprenticeship program for the applicable occupation that is approved by the chief.

Mike Stewart has been in the industry for 8 years and is a journeyman labor that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade.

Joseph Lopez has been in the industry for 9 years and is a journeyman labor that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade. He also is a experienced concrete sawcutter and equipment operator.

Eduardo Garcia has been in the industry for 10 years and is a journeyman labor that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade. He also is a experienced concrete sawcutter and equipment operator.

Eric Garcia has been in the industry for 8 years and is a journeyman labor that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade. He also is a experienced concrete sawcutter and equipment operator.

Francisco Chavez has been in the industry for 8 years and is a journeyman labor that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade.

Andrew Rivas has been in the industry for 5 years and is a graduated labor apprentice journeyman that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade.

Fidel Rivera has been in the industry for 5 years and is a graduated labor apprentice journeyman that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade.

Andrew Stanziale has been in the industry for 5 years and is a graduated labor apprentice journeyman that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade.

Armondo Ortiz has been in the industry for 5 years and is a graduated labor apprentice journeyman that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade.

Jesus Lopez Aguilar has been in the industry for 5 years and is a graduated labor apprentice journeyman that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade. Jesus is trained also to run skid steers

Ruben Hurtado has been in the industry for 10 years and is a journeyman labor that can do soft demolition as well as hard demolition. He has extensive experience in the demolition trade. He has extensive experience running excavators, backhoes, grinders, and skid steers



PROJECT MANUAL
INCLUDING SPECIFICATIONS

FOR

**OC FAIR AND EVENT CENTER CAMPGROUND
RESTROOM & SHOWER BUILDING**

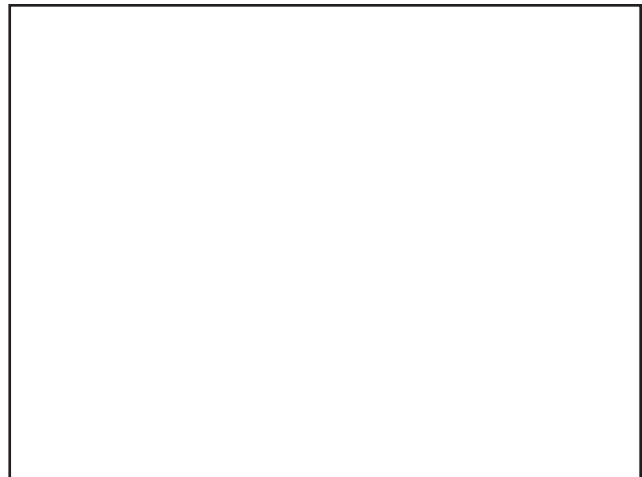
**88 FAIR DRIVE
COSTA MESA, CA 92626**

ARCHITECT

SVA ARCHITECTS
6 Hutton Centre Drive, Suite 1150
Santa Ana, CA 92707
Telephone: 949.809.3380

**SVA Project Number: 2024-40133
DSA A#04-124709**

11-19-2025

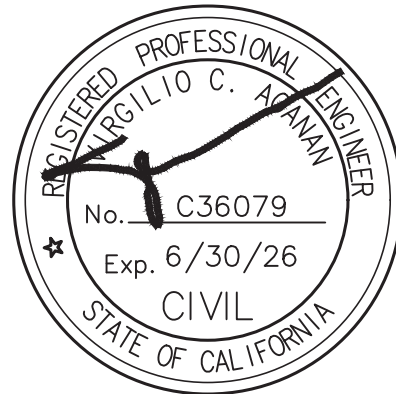


Specification Approval for:

**OC FAIR AND EVENT CENTER
CAMPGROUND AND MIDWAY -
SHOWER & RESTROOM BUILDINGS.**



Robert Simons, AIA C-18301
Architect, SVA Architects Inc.



Virgil C. Aoanan, P.E., S.E., C-36079
Civil Engineer, VCA Engineers



Fernan C. Siocon, PE, M-33178
Mechanical Engineer,
Alpha MEP Inc. Engineers



Jeremy Hatfield, P.E. E-22702
Electrical Engineer,
Alpha MEP Inc. Engineers

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**OC FAIR AND EVENT CENTER
CAMPGROUND –
SHOWER & RESTROOM BUILDING**

7/15/25

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Not used.

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Not used.

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Not used.

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Not used.

**OC FAIR AND EVENT CENTER
CAMPGROUND –
SHOWER & RESTROOM BUILDING**

7/15/25

DSA SUBMITTAL

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Not used.

END OF SECTION

SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Project consists of construction of the ***OC Fair and Event Center Campground Restroom Building, 88 Fair Drive Costa Mesa, CA 92626*** as indicated in Contract Documents.
 - 1. Owner reserves right to remove and retain possession of existing items prior to start of Contract.
 - 2. Removal of hazardous material shall be per separately provided hazardous material abatement report prepared by others. Architect shall not be involved in determination, removal or disposal of hazardous materials.

1.2 REQUIREMENTS INCLUDED

- A. This section includes administrative provisions:
 - 1. Work sequence.
 - 2. Contractors use of premises.
 - 3. Field engineering.
 - 4. Regulatory requirements and reference standards.
 - 5. Owner furnished Contractor installed products (OFCI).
 - 6. Owner pre-ordered products.

1.3 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner and Architect.
- B. Perform construction in phases as indicated.

1.4 CONTRACTORS USE OF PREMISES

- A. Limit use of premises for Work and construction operations and to allow for work by other contractors.
- B. Coordinate use of premises and access to site under direction of Owner and Architect.

1.5 FIELD ENGINEERING

- A. Provide field engineering services; establish lines and levels by use of recognized engineering survey practices.
- B. Locate and protect control and reference points.

1.6 REGULATORY REQUIREMENTS AND REFERENCE STANDARDS

A. Regulatory Requirements:

1. Architect has contacted governing authorities and reviewed design requirements of local, state and federal agencies for applicability to Project.
2. Contractor shall be responsible for contacting governing authorities directly for necessary information and decisions bearing upon performance of Work.

B. Reference Standards:

1. For Products specified by association or trade standards, comply with requirements of referenced standard, except when more rigid requirements are specified or are required by applicable codes.
2. Applicable date of each standard is that in effect as of date on proposal or date on Contract where no proposal is available, except when a specific date is specified.

1.7 OWNER FURNISHED CONTRACTOR INSTALLED PRODUCTS (OFCI)

A. Select products are to be furnished and paid for by Owner and installed by Contractor:

1. Refer to Drawings and Specifications.

B. Owner's Responsibilities:

1. Arrange for and deliver shop drawings, product data, and samples to Contractor.
2. Arrange and pay for product delivery to site.
3. Inspect products jointly with Contractor on delivery.
4. Submit claims for transportation damage.
5. Arrange for replacement of damaged, defective, or missing items.
6. Arrange for manufacturer's warranties, inspections, and service.

C. Contractor's Responsibilities:

1. Review shop drawings, product data, and samples.
2. Receive and unload products at site.
3. Inspect jointly with Owner for completeness and damage.
4. Handle, store, and install products.
5. Finish products as required after installation.
6. Repair or replace items damaged by Work of this Contract.

1.8 OWNER PRE-ORDERED PRODUCTS

A. Select products have been pre-ordered by Owner:

1. Refer to Drawings.

- B. Owner has negotiated purchase orders for these products for incorporation into Project.
 - 1. Purchase orders are assigned to Contractor; costs shall be included into base bid.
 - 2. Contractor's responsibilities are same as if Contractor negotiated purchase orders.

END OF SECTION

SECTION 01 20 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Special administrative and procedural requirements necessary to prepare and process Application for Payment.

1.2 SCHEDULE OF VALUE

- A. Coordination: Coordinate preparation of Schedule of Values with preparation of Contractor's Construction Schedule.
 - 1. Correlate line items in Schedule of Values with other required administrative forms and schedules, including application for Payment forms with Continuation Sheets, Submittals Schedule, and Contractor's Construction Schedule.
 - 2. Submit Schedule of Values to Architect at earliest possible date but no later than seven days before date scheduled for submittal of initial Application for Payment.
- B. Format and Content: Use Project Manual table of contents as guide to establish line items for Schedule of Values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include following Project identification on Schedule of Values.
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Submit draft of AIA Document G703 Continuation Sheets.
 - 3. Provide breakdown of Contract Sum in enough detail to facilitate continued evaluation of Application for Payment and progress reports. Coordinate with Project Manual table of contents.
 - a. Provide several line items for principal subcontract amounts where appropriate.
 - 4. Round amounts to nearest whole dollar; total shall equal Contract Sum.
 - 5. Provide separate line item in Schedule of Values for each part of Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

6. Provide separate line items in Schedule of Value for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of Work.
7. Each item in Schedule of Values and Application for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in Schedule of Values or distributed as general overhead expense at Contractor's option.
8. Schedule Updating: Update and resubmit Schedule of Values before next application for Payment when Change Orders or Construction Change Directives result in a change in Contract Sum.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment: Application for Payment at time of Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: Date for each progress payment is indicated in Agreement between Owner and Contractor. Period of construction Work covered by each Application for Payment is period indicated in Agreement.
- C. Payment Application Forms: AIA Document G702 and AIA Document G703 Continuation Sheets as form for Application for Payment.

USE FOLLOWING FOR LEED CERTIFIED PROJECTS.

1. LEED Progress Reports: With each application for payment, submit LEED action plans as specified in Section 01 35 10.
- D. Application Preparation: Complete every entry on form. Execute by person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 1. Entries shall match data on Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal:
 1. Contractor shall provide ten copies of Application for Payment one week prior to Payment Request ("Draw") Meeting, for review of team members.

2. Contractor shall provide ten wet signed copies of Application for Payment at Payment Request ("Draw") Meeting.
 - a. Provide each copy with transmittal form listing attachments and recording appropriate information about application.
 - b. Copies shall include waivers of lien and similar attachments if required.
- F. Waivers of Mechanic's Lien: With each Application for Payment submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of Contract and related to Work covered by payment.
 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 2. When an application shows completion of an item, submit final or full waivers.
 3. Owner reserves right to designate which entities involved in Work must submit waivers.
 4. Waiver Forms: Submit waivers of lien on forms executed in manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following.
 1. List of subcontractors.
 2. Schedule of Values.
 3. Contractor's Construction Schedule (preliminary if not final).
 4. Schedule of unit prices.
 5. Submittals Schedule (preliminary if not final).
 6. List of Contractor's staff assignments.
 7. List of Contractor's principal consultants.
 8. Copies of building permits.
 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of Work.
 10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.

- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted including but not necessarily limited to following.
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement accounting for final changes to Contract Sum.
 4. AIA Document G706, Contractor's Affidavit of Payment of Debts and Claims.
 5. AIA Document G706A, Contractor's Affidavit of Release of Liens.
 6. AIA Document G707, Consent of Surety to Final Payment.
 7. Evidence that claims have been settled.
 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Completion.
 9. Final liquidated damages settlement statement.

USE FOLLOWING FOR LEED CERTIFIED PROJECTS.

10. LEED Final Reports: Submit complete set of LEED Reports as required for submittal to USGBC and as specified in Section 01 35 10.

END OF SECTION

SECTION 01 23 00

ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes a description of alternate work.
- B. Related Requirements:
 - 1. Pricing Documents: Quotation of cost of each alternate.
 - 2. Owner-Contractor Agreement: Alternates accepted by Owner for incorporation into the Work.
 - 3. Sections of Specifications identified in each Alternate.

1.2 PROCEDURES

- A. Alternates will be exercised at Owner's option.
- B. Coordinate Related Work: and modify surrounding work as required to complete Work, including changes under each alternate, when acceptance is designated in Owner-Contractor Agreement.

1.3 ALTERNATES

A. Alternates: Refer to the list below for the Alternate for the Project.

B. Alternate No. 2: Delete Architectural Light Fixtures

- 1. Work Included in Alternate: Provide a deduct cost for the removal of each line item associated with the Architectural Light Fixtures identified in the Alternate Bid Lighting Fixture Schedule on Sheet E-50.4 – Lighting Fixture Schedule. Fixtures included in this deduct are:

- Eight (8) fixtures designated as Keynote 9A
- Nine (9) fixtures designated as Keynote 7

The alternate includes substitution of base or standard lighting fixtures in place of the specified architectural lighting. Deduct cost shall be itemized by fixture type and shall include all associated materials, labor, and subcontractor scope adjustments.

- 2. Work Included in Contract Price: Base contract price includes all specified Architectural Light Fixtures as indicated on the Drawings and in the Lighting Fixture Schedule. Installation, wiring, controls, and all associated components are included in the base scope.

3. Refer to Section 26 00 00 – General Electrical Requirements
4. Refer to Drawing No. A12.1 – Reflected Ceiling Plan, E-12.1 – Lighting Plan – Expansion, and E-50.4 – Lighting Fixture Schedule.

END OF SECTION

SECTION 01 25 00

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. General: Procedures are described for requesting substitution of unlisted materials in lieu of materials named in Specifications or approved for use in addenda.
 - 1. Provide products listed in Contract Documents, products by manufacturers listed in Contract Documents, and products meeting specified requirements.
 - a. Contract Amount: Base on materials and products included in Contract Documents.
 - b. Where materials and products are listed in Contract Documents, materials and products by manufacturers not listed shall not be used without Owner's and Architect's approval of Contractor's written request for substitution.
 - 2. Purpose: After bidding, substitutions will only be considered where Owner will receive benefit or because specified materials are no longer available due to no fault of Contractor.
 - 3. Purpose: Substitutions will only be considered where Owner will receive benefit or because specified materials are no longer available due to conditions beyond Contractor control.
 - a. Owner benefits either from a Contractor proposed reduction of the Contract amount or from a reduction in Contract time based on acceptance of proposed substitution.
 - b. List proposed cost or time reductions on request for substitution.
 - c. Requests not including a proposed cost or time reduction will not be considered unless Contractor submits supporting information indicating specified materials are not available.
- B. Related Sections:
 - 1. Section 01 60 00: Product requirements.

1.2 SUBSTITUTIONS

- A. Within a period of 35 days after award of Contract, Owner and Architect will consider formal requests for substitutions only from Contractor as specified in 1.1 Summary.
 - 1. Owner and Architect will consider only one request for substitution for each material; where requests are denied Contractor shall be required to provide specified materials.

2. After initial 35-day period, requests will be considered only when a product becomes unavailable through no fault of Contractor; more than one request for substitution will be considered if necessary.
- B. Prior to submittal of second Request for Payment Owner and Architect will consider formal requests for substitutions from Contractor as specified in 1.1 Summary.
 1. Owner and Architect will consider only one request for substitution for each material; where requests are denied Contractor shall be required to provide specified materials.
 2. After payments begin, requests will be considered only when a product becomes unavailable through no fault of Contractor; more than one request for substitution will be considered if necessary.
- C. Submit each request with sequentially numbered "Substitution Request Transmittal" acceptable to Owner and Architect; submit separate request for each product and support each request with:
 1. Product identification with manufacturer's literature and samples where applicable.
 2. Name and address of similar projects on which product has been used, and date of installation.
- D. Submit itemized comparison of proposed substitution with product specified and list significant variations.
- E. Submit data relating to changes in construction schedule.
- F. Note effect of substitution on other work, products, or separate contracts.
 1. Note if acceptance of substitution could require revision of Contract Documents, Drawings, details or Specifications.
- G. Include accurate cost data comparing proposed substitution with product and amount of net change in Contract price.
 1. Include costs to other contractors and costs for revisions to Drawings, details or Specifications.
- H. Substitutions will not be considered for acceptance when:
 1. They are indicated or implied on submittals without a formal request from Contractor.
 2. They are requested directly by a subcontractor or supplier.
 3. Acceptance will require substantial revision of Contract Documents.
- I. Substitute products shall not be ordered without written acceptance of Owner and Architect.

- J. Owner and Architect will determine acceptability of proposed substitutions and reserves right to reject proposals due to insufficient information.

1.3 CONTRACTOR'S REPRESENTATION

- A. Requests constitute a representation that Contractor:
 - 1. Has investigated proposed product and determined it meets or exceeds, in all respects, specified product.
 - 2. Will provide same warranty or longer warranty for substitution as for specified product.
 - 3. Will coordinate installation and make other changes that may be required for Work to be complete in all respects.
 - 4. Waives claims for additional costs that subsequently become apparent.
 - 5. Will pay costs of changes to Contract Documents, Drawings, details and Specifications required by accepted substitutions.

1.4 ARCHITECT'S DUTIES

- A. Review Contractor's requests for substitutions with reasonable promptness.
 - 1. Architect will recommend that Owner accept or reject substitution request.
 - 2. Upon request, Architect will provide cost for changes to Contract Documents, Drawings, details and Specifications required for substitutions.
- B. Notify Contractor in writing of decision to accept or reject requested substitution.

CONTRACTOR'S SUBSTITUTION REQUEST

(Use separate form for each request)

Date: _____ Request No.: _____

TO: Architect
Phone: _____ Fax: _____

PROJECT: _____ Project No.: _____
CONTRACTOR _____

SPECIFIED ITEM: _____
Section: _____ Page: _____ Paragraph: _____ Description: _____
Drawing Number(s): _____ Detail Number(s): _____
The undersigned request consideration of the following:
PROPOSED SUBSTITUTION: _____

REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEMS: _____

SAVINGS or CREDIT to OWNER for ACCEPTING SUBSTITUTE: \$ _____
PROJECT COMPLETION CHANGE for ACCEPTING SUBSTITUTE Days _____

Attached data includes description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies that the following paragraphs, unless modified by attachments, are correct:

1. Proposed substitution has been fully checked and coordinated with the Contract Documents.
2. The proposed substitution does not affect dimensions shown on Drawings.
3. The proposed substitution does not require revisions to mechanical or electrical work.
4. The undersigned will pay for changes to the building design, including architectural and engineering design, detailing, and construction costs caused by the requested substitution.
5. The proposed substitution will have no adverse effect on other trades, construction schedule, or warranty.
6. Maintenance and service parts will be locally available for the proposed substitution.
7. The proposed substitution will have no adverse effect on LEED credits (applies to LEED Projects ONLY)
8. The proposed substitution will have no adverse effect on Green Building Requirements where applicable.

The undersigned further states that the function, appearance, and quality of the proposed substitution are equivalent or superior to the specified item.

Attachments: The attached data is furnished herewith for evaluation of the proposed substitution.

☐ Catalog ☐ Drawings ☐ Samples ☐ Reports ☐ Tests ☐ Other: _____

Submitted by: _____

(Firm) _____
(Authorized Legal Signature)

(Address) _____
(Telephone)

For use by the Architect: ☐ Accepted ☐ Accepted as Noted ☐ Rejected: Submit Specified Item

BY: _____
(Authorized Signature)

Date: _____ Remarks: _____

OC FAIR AND EVENT CENTER
CAMPGROUND –
SHOWER & RESTROOM BUILDING

7/15/25

DSA SUBMITTAL

END OF SECTION

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: This section specifies administrative and procedural requirements governing Contract modification procedures.
 - 1. Requests for Information (RFI).
 - 2. Change Order.
 - 3. Allowances.
 - 4. Construction Change Directive.
- B. Related Requirements:
 - 1. Section 01 25 00: Substitution procedures.
 - 2. Section 01 30 00: Administrative requirements.

1.2 MINOR CHANGES IN WORK

- A. Architect will issue supplemental instructions authorizing minor changes in Work, not involving adjustment to Contract Sum or Contract Time, on AIA Form G710, Architect's Supplemental Instructions or similar form.

1.3 REQUESTS FOR INFORMATION

- A. Contractor may submit a written Request for Information (RFI) in format approved by Architect relating to perceived inconsistencies and omissions in Contract Documents.
 - 1. A record of RFI's is to be maintained by Contractor along with information regarding origin of request, date of request, and date request was received from Architect. Number RFI's sequentially based on date of request.
- B. Requests for Information shall be used only as a means of obtaining clarification of information not included in Contract Documents and shall not be used to assist Contractor in preparation of shop drawings or other information required by Contract.
 - 1. Contract Documents are intended to contain enough information to show aesthetic and design intent and to provide information such that construction procedures (means and methods) may be reasonably inferred.
 - 2. Contract Documents are not intended to provide specific information related to means and methods of construction nor are they intended to be exhaustive in content.
- C. Contractor shall carefully review requests for information by subcontractors and suppliers to ascertain if information is in Contract Documents prior to submitting a Request for Information to Architect based on requests by others.

1. Contractor may suggest possible solutions to fit Project conditions where appropriate.
- D. Architect reserves right to return RFI's that do not reasonably relate to necessary clarification of intent of Contract Documents and to charge Contractor for time and materials involved in answering RFI's where information is in Contract Documents.
 1. RFI's shall not be used as a request for substitutions; refer to Section 01 25 00 – Substitution Procedures.

1.4 CHANGE ORDERS

- A. Owner-Initiated Proposal Requests: Architect will issue detailed description of proposed changes in Work that require adjustment to Contract Sum or Contract Time. If necessary, description will include supplemental or revised Drawings and Specifications.
 1. Proposal requests issued by Architect are for information only. Do not consider changer order proposal requests as instruction either to stop work in progress or to execute proposed change.
 2. Within 10 days of receipt of a proposal request, submit estimate of cost necessary to execute change to Architect for Owner's review.
 - a. Include list of quantities of products required and unit costs, with total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
 - c. Include a statement indicating effect of proposed change in Work will have on Contract Time.
- B. Contractor-Initiated Proposals: When latent or unforeseen conditions require modifications to Contract, Contractor may propose changes by submitting a request for a change to Architect and Owner.
 1. Include statement of reasons for change and effect of change on Work. Provide a complete description of proposed change. Indicate effect of proposed change on Contract Sum and Contract Time.
 2. Include a list of quantities of products required and unit costs with total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
 4. Comply with requirements in Section 01 25 00 - Substitution Procedures if proposed change requires substitution of unspecified product or system for specified product or system.

- C. Proposal Request Form: Use AIA Document G709 for Change Order Proposal Requests; other substitute formats shall be submitted to Owner and Architect for approval prior to use.
- D. Change Order Procedures: Contractor shall be directed to proceed with Work upon Owner's approval of Proposal.
 - 1. Architect will issue Change Order for signatures of Owner and Contractor on AIA Form G701 or similar form, including approved Change Order proposals for that time period.
 - 2. Amounts of each Change Order shall be indicated in each Request for Payment including payment status for each individual Change Order.

1.5 ALLOWANCES

- A. Allowance Adjustment: For Contract items bid based on allowance, submit Change Order Proposal on difference between actual purchase amount and allowance, based on work-in-place.
 - 1. Include installation cost in purchase amount only where indicated as part of allowance.
 - 2. When requested, prepare explanations and documentation to substantiate amounts claimed for work done based on allowances.
 - 3. Submit substantiation of a change in Scope of work claimed in Change Orders related to allowances.
 - 4. Owner reserves right to establish actual quantity of work-in-place by independent quantity survey, measure or count.
- B. Submit claims for increase costs because of a change in scope or nature of allowance described in Contract Documents, whether for purchase order amount or Contractor's handling, labor, installation, overhead and profit.
 - 1. Submit claims within 21 days of receipt of Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days.
 - 2. Do not include Contractor's or subcontractor's indirect expense in Change Order cost amount unless it is clearly shown that nature or extent of work has changed from what could have been foreseen from information in Contract Documents.
 - 3. No change to Contractor's indirect expense is permitted for selection of higher or lower-priced materials or systems of same scope and nature as originally indicated.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: When Owner and Contractor disagree on terms of Proposal Request, Architect may issue a Construction Change Directive per AIA Form G714 or similar form.
 - 1. Construction Change Directive instructs Contractor to proceed with change in Work, for subsequent inclusion in Change Order.
 - 2. Construction Change Directive contains a complete description of change in Work. It also designates method to be followed to determine change in Contract Sum or Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of Work required by Construction Change Directive. Coordinate scheduling with Construction Manager to allow monitoring by Owner if desired.
 - 1. After completion of change, submit itemized account and supporting data necessary to substantiate cost and time adjustments to Contract.

END OF SECTION

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes general procedural requirements for ongoing submittals.
 - 1. Schedule of values.
 - 2. Product data and manufacturer's literature.
 - 3. Shop drawings.
 - 4. Samples.
 - 5. Manufacturers' certificates.
 - 6. Excess materials and attic stock.
 - 7. Design build (delegated design) procedures.
 - 8. Deferred approval requirements.
- B. Related Requirements:
 - 1. Section 01 31 00: Project management and coordination.
 - 2. Section 01 32 00: Construction Schedule – Network Analysis.
 - 3. Section 01 32 10: Construction Schedule – Bar Chart.
 - 4. Section 01 40 00: Test reports, manufacturer's field reports, and mock-ups.
 - 5. Section 01 70 00: Manufacturers' instructions.
 - 6. Section 01 77 00: Closeout requirements including Project Record Documents.
 - 7. Section 01 78 00: Warranties.

1.2 GENERAL SUBMITTAL PROCEDURES

- A. Submittals: Transmit each item using form approved by Architect; submit sample to Architect for approval prior to use.
 - 1. Identify Project, Contractor, subcontractor, major supplier.
 - a. Attach sequential identification number for each new submittal.
 - b. Identify each resubmittal using original submittal number and sequential identification clearly indicating item is resubmitted.
 - 2. Identify pertinent Drawing sheet and detail number, and Specification section number as appropriate.
 - 3. Identify deviations from Contract Documents.
 - 4. Provide space for Contractor and Architect review stamps.

5. Contractor: Review and stamp submittals from subcontractors prior to submitting to Architect.
 - a. Review submittals and indicate where conflicts occur with Contract Documents and with work of other subcontractors.
 - b. Return submittals that vary significantly from Contract Documents for correction and resubmittal prior to submitting to Architect.
 - c. Submittals that vary significantly from Contract Documents and that fail to indicate thorough Contractor review prior to submission to Architect will be returned without review.
 - d. cursory review and stamping of subcontractor submittal by Contractor shall not be acceptable.
- B. Initial Schedules: Submit initial progress schedule and schedule of value in duplicate within 15 working days after award of Contract.
 1. After review by Owner and Architect revise and resubmit where required.
- C. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- D. After Architect review of submittal, revise and resubmit as required, identify changes made since previous submittal.
- E. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply.

1.3 TYPES OF SUBMITTALS

- A. General: Project requires various types of submittals to maintain communications, minimize misunderstandings, avoid unnecessary conflicts, and to ensure complete documentation for Project Record Documents.
 1. Maintain complete set of submittals including required revisions.
- B. Construction Schedules: Submit construction progress schedules for Design Team and Owner review and to maintain entire team up-to-date on construction activities.
- C. Schedule of Values: Submit Schedule of Values indicating division of Work, subcontractors to perform work, products being used, and values attributed to each to inform Design Team and Owner.
- D. Action Submittals: Submittals relating to product data and manufacturer's literature, shop drawings, and samples for Design Team review and comment; do not begin fabrication, delivery, or installation until Design Team review is complete.
- E. Information Submittals: Submittals relating to certifications, qualifications, reports, including test reports, and instructions are for information; Design Team may choose to comment but action is not generally anticipated.

1. Manufacturer installation instructions and recommendations shall be considered information submittals.
- F. Design/Build Submittals: Where portion of Work requires design by specialized professionals submit information necessary to ensure work complies with Contract Documents along with certifications signed by qualified professional.
 1. Calculations: Do not submit calculations unless specifically required by Contract Documents; submit calculations required by applicable authorities directly to applicable authorities;
 - a. Submit certification by qualified professional indicating required calculations have been prepared and work conforms to Contract Documents and applicable codes and regulations.
- G. Maintenance Materials Submittals: Compile maintenance information and materials during Work to ensure complete set of documents, maintenance manuals, and operation instructions.
- H. Closeout Submittals: Compile closeout submittals, organize, and submit to Owner prior to or at time of Substantial Completion. Project will not be considered Substantially Complete until closeout submittals have been received by Owner.
- I. Material Safety Data Sheets (MSDS): MSDS will only be reviewed by Architect when submitted to show compliance with LEED certification requirements.
 1. Non-LEED submittals that include material safety data sheets will be returned for resubmittal.

1.4 SCHEDULE OF VALUES

- A. Submit typed schedule on AIA Form G703 or another Owner and Architect pre-approved 8-1/2" by 11" paper format; Contractor's standard media-driven printout will be considered on request. Submit within 15 days after award of Contract.
- B. Format: Table of Contents of this Project Manual, with modifications as pre-approved by Owner and Architect; identify each line item with number and title of major Specification sections.
- C. Include in each line item a directly proportional amount of Contractor overhead and profit.
- D. Revise schedule to list change orders for each Application for Payment.
 1. Submit subschedule for each phase of Work.

1.5 PRODUCT DATA/MANUFACTURERS' LITERATURE

- A. Action Submittals: Mark each copy to identify applicable Products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.

- B. Information Submittals: Include manufacturers' installation instructions only when required by Specifications or specifically requested by Architect.
 - 1. Maintain copy of manufacturer installation instructions and recommendations in Contractor's field office for review.
- C. Product data shall be submitted as electronic PDF files unless otherwise noted or approved by Architect in advance.
 - 1. Where paper copies are permitted submit number of copies Contractor requires, plus one copy to be retained by Architect.
- D. Submit number of copies Contractor requires, plus one copy to be retained by Architect.

1.6 SHOP DRAWINGS

- A. Shop drawings shall be submitted as electronic PDF files unless otherwise noted or approved by Architect in advance.
 - 1. Where prints are permitted submit one reproducible print; minimum sheet size 8-1/2" by 11".
- B. Shop drawings shall be submitted in reproducible format acceptable to Architect and Owner; computerized PDF files will be acceptable unless otherwise directed.
 - 1. Prints: Submit one reproducible print; minimum sheet size 8-1/2" by 11".
 - 2. Prints: Submit three reproducible prints; minimum sheet size 8-1/2" by 11".
- C. Distribution: After review, reproduce and distribute.

1.7 SAMPLES

- A. Submit full range of manufacturers' standard colors, textures, and patterns for Architect's selection.
- B. Submit samples to illustrate functional characteristics of Product, with integral parts and attachment devices.
- C. Coordinate submittal of different categories for interfacing work.
- D. Include identification on each sample, giving full information.
- E. Submit number of samples required by Contractor plus one to be retained by Architect.
 - 1. Maintain one set of approved samples at Project Field Office.

F. Sizes: Provide following sizes unless otherwise specified.

1. Flat or Sheet Products: Minimum 6" square, maximum 12" by 12".
2. Linear Products: Minimum 6", maximum 12" long.
3. Bulk Products: Minimum one pint, maximum one gallon.

G. Full size samples may be used in the Work upon approval.

1.8 MANUFACTURERS' CERTIFICATES

A. Submit certificates, in duplicate in accordance with requirements of each Specification section.

1.9 EXCESS MATERIALS AND ATTIC STOCK

A. Excess Materials: Excess materials shall be considered property of Owner; inform Owner of extent of excess materials and methods required for handling and storage; remove from site excess materials not required by Owner for maintenance stock.

B. Attic Stock: Owner may choose to obtain additional attic stock for maintenance purposes where excess materials are not considered adequate.

1. Owner may require as much as 5% extra materials for maintenance purposes. Exact amount of each material shall be determined by Owner based on following meeting and additional costs determined by Contractor.
 - a. Contractor shall be prepared to order up to 5% extra materials on items that may not be readily available in future such as custom colors, off-shore manufacture, anticipated life span under 5 years, and potential for damage.
 - 1) Do not order extra attic stock until extent is determined and agreed to by Owner including which materials require extra stock and exactly how much those materials will cost including shipping and handling.
 - b. Excess Materials: Furnish excess materials only for materials that have a shelf-life of more than three years.
2. Meeting: Conduct meeting prior to beginning Work to discuss extent of materials Owner would like to receive at Project Closeout for attic stock for maintenance materials; where available include personnel from Owner's maintenance crew.
 - a. Estimate amount of excess materials to be anticipated to be ordered in addition to materials for handling and storage and how those materials will be invoiced and identified regarding material and location in Project.
 - b. Determine area necessary for adequate storage, handling, and identifying excess materials and attic stock and discuss with Owner.
 - c. Submit information regarding equipment necessary for handling of excess materials and attic stock due to weight, size, and storage requirements.

- d. Assist Owner in determining where on-site or off-site additional attic stock for maintenance purposes will be delivered and stored.
3. Additional Costs: After meeting submit to Owner detailed listing of additional costs for each material Owner may like to receive for attic stock and assist Owner in modifying listing to determine acceptable final costs.
 - a. Include unit prices for desired attic stock where excess materials are not adequate for Owner maintenance stock.
4. Substantial Completion: Submit Construction Bulletin at Substantial Completion indicating changes to Contract Amount for attic stock including unit price totals for materials where excess materials are not adequate.
5. Final Completion: Ensure attic stock has been received, identified, cataloged, and stored at locations agreed upon with Owner based on Change Order indicating amounts finally agreed to by Owner.

1.10 DESIGN/BUILD PROCEDURES

- A. Design as Part of Means and Methods of Construction: Select Project components require construction team design as part of means and methods of construction as described in various sections.
 1. Terms commonly used such as Design/Build, Delegated Design, and Design/Assist are applicable to these procedures as determined by law but shall be generally referred to in these documents as Design/Build.
 - a. In general Design/Build includes design by licensed professionals with expertise beyond that allowed under standard architectural licensure, and outside of scope of work of other design professionals on the design team.
 2. Contractor may be required to provide design services as part of construction for specific work defined as design or design-build where special expertise is required that is not available in the Project design team.
 3. Subcontractors, fabricators, and manufacturers may be required to provide design services as part of their work due to special expertise in design services for their specific components, refer to technical sections for Design/Build.
 4. Contractor, subcontractors, fabricators, manufacturers, and suppliers shall be responsible for attachments, anchors, fasteners, adhesives, and connectors suitable to applications unless specific items are listed in Contract Documents.
 - a. Where specific items are listed in Contract Documents Contractor, subcontractors, fabricators, manufacturers, and suppliers shall review and submit comments where items listed are not acceptable.
 - b. Where no comments are received, listed items shall be considered acceptable.

- B. Contractor acknowledges and accepts responsibility for specialty design as part of means and methods of construction, as well as coordination of parties involved to achieve architectural design intent indicated in Contract Documents.
 - 1. Design-build work includes sizing, sequencing, and detailing for construction by professional licensed or registered engineer or design professional with special expertise applicable to portion of Work involved.
 - 2. Design-build work shall be constructed in compliance with building codes and regulations in effect and shall be fit and proper for intended use.
 - 3. Design-build work shall include drawings, specifications, and calculations prepared, stamped, and signed by qualified professional licensed or registered engineer licensed in the Project location as appropriate to design-build work.
 - a. Plans, specifications, and calculations shall be acceptable to Owner, Owner's Representative, and applicable authorities.
- C. Where required by Owner Contractor shall submit copies of current insurance policies covering errors and omissions of persons designing design-build work with deductibles and limits per occurrence as mutually agreed by Owner and Contractor.
 - 1. Provide endorsement to insurance providing for 30-day notice to Owner prior to cancellation or material reduction in coverage.
 - 2. Insurance shall be maintained for not less than applicable statute of limitations for claims of latent defects, if such insurance is not written on an occurrence basis during time design-build work is designed and constructed.
- D. Review proposed layouts with Design Team and with various trades prior to commencing work related to design-build work.

1.11 DEFERRED APPROVAL REQUIREMENTS

- A. Installation of deferred approval items shall not be started until detailed plans, specifications, and engineering calculations have been accepted and signed by Architect or Engineer of Record responsible for Project design.
- B. Deferred Approval Items shall be signed by California registered architect or professional engineer delegated responsibility covering specific work shown requiring approval by the AHJ.
 - 1. Deferred approval items for this Project include but may not be limited to following:
 - a. Fire Alarm – Section 26 00 00.
 - b. Fire Sprinkler (In Accordance with NFPA 13) – Section 21 13 13
 - c. Fire On-Site Underground Water System – Section 33 11 00
 - d. Storefront System – Section 08 41 00

2. Deferred approval drawings and specifications become part of the approved submittal documents for the Project when they are submitted to and approved by the AHJ.

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Description of Project management and coordination including but not necessarily limited to the following:
 - 1. General Project coordination procedures.
 - 2. Coordination drawings.
 - 3. Staff names.
 - 4. Administrative and supervisory personnel.
 - 5. Project meetings.
- B. Related Sections:
 - 1. Section 01 30 00: Administrative requirements.
 - 2. Section 01 79 00: Demonstration and training.

1.2 COORDINATION

- A. Coordination: Coordinate construction operations included in various Specifications sections to ensure efficient and orderly installation of each part of Work.
 - 1. Coordinate construction operations that depend on each other for proper installation, connection, and operation.
 - 2. Coordinate work to assure efficient and orderly sequence of installation of construction elements.
 - 3. Make provisions for accommodating items installed by Owner or under separate contracts.
- B. Prepare memoranda for distribution to each party involved as needed, outlining special procedures required for coordination.
 - 1. Include required notices, reports, and list of attendees at meetings; include Architect and Owner in distribution.
- C. Verify characteristics of interrelated operating equipment are compatible; coordinate work having interdependent responsibilities for installing, connection to, and placing such equipment in service.

- D. Coordinate space requirements and installation of mechanical and electrical work indicated diagrammatically on Drawings.
 - 1. Follow routing shown for pipes, ducts, and conduits as closely as possible; make runs parallel with lines of building.
 - 2. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
 - 3. In existing building areas, prepare openings and pathways as required. Repair finishes to match existing adjacent conditions.
- E. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated; coordinate locations of fixtures and outlets with finish elements.
- F. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other construction activities and activities of other contractors to avoid conflicts and ensure orderly progress of Work.

1.3 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings for areas where space availability is limited and necessitates maximum utilization of space for components and where separate entities, products, and materials require coordination.
 - 1. Require each subcontractor with items located in ceiling space to furnish coordination drawings of their items to assist in preparation of Contractor's Coordination Drawings.
 - 2. Indicate relationship of components shown on separate Shop Drawings.
 - 3. Indicate required installation sequences.
 - 4. Ceiling Spaces: Take special care to coordinate structure, ceiling systems, equipment located in ceiling spaces, fire protection systems, mechanical systems, and electrical systems.
- B. Staff Names: Immediately after receipt of notice to proceed or immediately after signing of Contract by Owner and Contractor, submit list of principal staff assignments, including superintendent and other personnel in attendance at Project site.
 - 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone.

1.4 SUPERVISORY AND ADMINISTRATIVE PERSONNEL

- A. Provide supervisory personnel, in addition to Project Superintendent, as required for proper and timely performance of Work and coordination of subcontracts.
- B. Provide administrative staff as required to allow Project Superintendent and supervisory personnel to allocate maximum time to Project supervision and coordination.

1.5 PROJECT MEETINGS

- A. Schedule and administer Project meetings throughout progress of Work:
 - 1. Pre-construction meeting.
 - 2. Progress meetings at weekly intervals.
 - 3. Pre-installation conferences.
 - 4. Coordination meetings.
 - 5. Special meetings.
- B. Make physical arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes and distribute copies within two days to Architect, Owner, participants, and those affected.
- C. Attendance: Job superintendent, major subcontractors and suppliers as appropriate to agenda; Architect, Owner, and Owner and Architect's consultants as appropriate to agenda topics for each meeting.
- D. Suggested Agenda: Review of Work progress, status of progress schedule and adjustments, delivery schedules, submittals, requests for information, maintenance of quality standards, pending changes and substitutions, and issues needing resolution.

END OF SECTION

SECTION 01 32 00

CONSTRUCTION SCHEDULE - NETWORK ANALYSIS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. References.
- B. Performance requirements.
- C. Quality assurance.
- D. Qualifications.
- E. Project record documents.
- F. Submittals.
- G. Review and evaluation.
- H. Format.
- I. Cost and schedule reports.
- J. Early work schedule.
- K. Construction schedule.
- L. Short interval schedule.
- M. Requested time adjustment schedule.
- N. Recovery schedule.
- O. Updating schedules.
- P. Distribution.

1.2 REFERENCES

- A. Construction Planning and Scheduling Manual - A Manual for General Contractors and the Construction Industry, The Associated General Contractors of America (AGC).
- B. CSI - Construction Specifications Institute Master Format 2004 Edition and updates.
- C. National Weather Service - Local Climatological Data.

1.3 PERFORMANCE REQUIREMENTS

- A. Ensure adequate scheduling during construction activities so work may be prosecuted in an orderly and expeditious manner within stipulated Contract Time.
- B. Ensure coordination of Contractor and subcontractors at all levels.
- C. Ensure coordination of submittals, fabrication, delivery, erection, installation, and testing of materials and equipment.
- D. Ensure on-time delivery of Owner furnished materials and equipment.
- E. Ensure coordination of jurisdictional reviews.
- F. Assist in preparation and evaluation of applications for payment.
- G. Assist in monitoring progress of work.
- H. Assist in evaluation of proposed changes to Contract Time.
- I. Assist in evaluation of proposed changes to Construction Schedule.
- J. Assist in detection of schedule delays and identification of corrective actions.

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with Construction Planning and Scheduling Manual published by the AGC.
- B. Maintain one copy of document on site.
- C. In the event of discrepancy between the AGC publication and this section, provisions of this section shall govern.

1.5 QUALIFICATIONS

- A. Scheduler: Personnel or specialist consultant with 5 years minimum experience in scheduling construction work of a complexity and size comparable to this Project.
- B. Administrative Personnel: 5 years minimum experience in using and monitoring schedules on comparable projects.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 01 77 00.
- B. Submit one reproducible and two copies of final Record Construction Schedule which reflects actual construction of this Project.
- C. Record schedule shall be certified for compliance with actual way project was constructed.

- D. Receipt of Record Construction Schedule shall be a condition precedent to any retainage release or final payment.

1.7 SUBMITTALS

- A. Within 7 days from the Notice of Award submit proposed Early Work Schedule and preliminary Cost Report defining activities for first 60 days of Work.
- B. Within 45 days from Notice of Award submit proposed Construction Schedule and final Cost Report.
- C. Submit updated Construction Schedule at least 10 days prior to each Application for Payment.
- D. Submit Short Interval Schedule at each Construction Progress Meeting.
- E. Submit Time Adjustment Schedule within 10 days of commencement of a claimed delay.
- F. Submit Recovery Schedules as required by completion of work.
- G. Submit one reproducible and two copies of each schedule and cost report.

1.8 REVIEW AND EVALUATION

- A. Early Work Schedule shall be reviewed during Preconstruction Conference with Owner and Architect.
- B. Within 5 days of receipt of Owner and Architect's comments provide satisfactory revision to Early Work Schedule or adequate justification for activities in question.
- C. Acceptance by Owner of corrected Early Work Schedule shall be a condition precedent to making any progress payments for first 60 days of Contract.
- D. Cost loaded values of Early Work Schedule shall be basis for determining progress payments during first 60 days of Contract.
- E. Participate in joint review of Construction Schedule and Reports with Owner and Architect.
- F. Within 7 days of receipt of Owner and Architect's comments provide satisfactory revision to Construction Schedule or adequate justification for activities in question.
- G. In the event that an activity or element of work is not detected by Owner or Architect review, such omission or error shall be corrected by next scheduled update and shall not affect Contract Time.
- H. Acceptance by Owner of corrected Construction Schedule shall be a condition precedent to making any progress payments after first 60 days of Contract.
- I. Cost-loaded values of Construction Schedule shall be basis for determining progress payments.

- J. Review and acceptance by Owner and Architect of Early Work Schedule or Construction Schedule does not constitute responsibility whatsoever for accuracy or feasibility of schedules nor does such acceptance expressly or impliedly warrant, acknowledge or admit reasonableness of activities, logic, duration, manpower, cost or equipment loading stated or implied on schedules.

1.9 FORMAT

- A. Prepare diagrams and supporting mathematical analyses using Precedence Diagramming Method, under concepts and methods outlined in AGC Construction Planning and Scheduling Manual.
- B. Listings: Reading from left to right, in ascending order for each activity.
- C. Diagram Size: 42 inches maximum height x width required.
- D. Scale and Spacing: To allow for legible notations and revisions.
- E. Illustrate order and interdependence of activities and sequence of work.
- F. Illustrate complete sequence of construction by activity.
- G. Provide legend of symbols and abbreviations used.

1.10 COST AND SCHEDULE REPORTS

- A. Activity Analysis: Tabulate each activity of network diagram and identify for each activity:
 - 1. Description.
 - 2. Interface with outside contractors or agencies.
 - 3. Number.
 - 4. Preceding and following number.
 - 5. Duration.
 - 6. Earliest start date.
 - 7. Earliest finish date.
 - 8. Actual start date.
 - 9. Actual finish date.
 - 10. Latest start date.
 - 11. Latest finish date.
 - 12. Total and free float.

13. Identification of critical path activity.
14. Monetary value keyed to Schedule of Values.
15. Manpower requirements.
16. Responsibility.
17. Percentage complete.
18. Variance positive or negative.

B. Cost Report: Tabulate each activity of network diagram and identify for each activity:

1. Description.
2. Number.
3. Total cost.
4. Percentage complete.
5. Value prior to current period.
6. Value this period.
7. Value to date.

C. Required Sorts: List activities in sorts or groups:

1. By activity number.
2. By amount of float time in order of early start.
3. By responsibility in order of earliest start date.
4. In order of latest start dates.
5. In order of latest finish dates.
6. Application for payment sorted by Schedule of Values.
7. Listing of activities on critical path.
8. Listing of basic input data which generates schedule.

1.11 EARLY WORK SCHEDULE

- A. Shall establish scope of work to be performed during first 60 days of Contract.
- B. Shall designate critical path or paths.

- C. Shall contain the following phases and activities:
 - 1. Procurement activities to include mobilization, shop drawings and sample submittals.
 - 2. Identification of key and long-lead elements and realistic delivery dates.
 - 3. Construction activities in units of whole days limited to 14 days for each activity except non-construction activities for procurement and delivery.
 - 4. Approximate cost and duration of each activity.
- D. Shall contain seasonal weather considerations. Seasonal rainfall shall be 10 year average for the month as evidenced by Local Climatological Data obtained from U.S. National Weather Service.
- E. Activities shall be incorporated into Construction Schedule.
- F. No application for payment will be evaluated or processed until Early Work Schedule has been submitted and reviewed.
- G. Shall be updated on a monthly basis while Construction Schedule is being developed.
- H. Failure to submit an adequate or accurate Early Work Schedule or failure to submit on established dates will be considered a substantial breach of Contract.

1.12 CONSTRUCTION SCHEDULE

- A. Include Early Work Schedule as first 60 days of Construction Schedule.
- B. Shall be a computer generated time scaled network diagram of activities.
- C. Indicate a completion date for project that is no later than required completion date subject to any time extensions processed as part of a change order.
- D. Conform to mandatory dates specified in the Contract Documents.
- E. Should schedule indicate a completion date earlier than any required completion date, Owner or Architect shall not be liable for any costs should project be unable to be completed by such date.
- F. Seasonal weather shall be considered in planning and scheduling of all work. Seasonal rainfall shall be 10 year average for the month as evidenced by Local Climatological Data obtained from U.S. National Weather Service.
- G. Level of detail shall correspond to complexity of work involved.
- H. Indicate procurement activities, delivery, and installation of Owner furnished material and equipment.
- I. Designate critical path or paths.

- J. Subcontractor work at all levels shall be included in schedule.
- K. As developed shall show sequence and interdependence of activities required for complete performance of Work.
- L. Shall be logical and show a coordinated plan of Work.
- M. Show order of activities and major points of interface, including specific dates of completion.
- N. Duration of activities shall be coordinated with subcontractors and suppliers and shall be best estimate of time required.
- O. Shall show description, duration and float for each activity.
- P. Failure to include any activity shall not be an excuse for completing all work by required completion date.
- Q. No activity shall have a duration longer than 14 days or a value over \$20,000.00 except non-construction activities for procurement and delivery.
- R. An activity shall meet the following criteria:
 - 1. Any portion or element of work, action, or reaction that is precisely described, readily identifiable, and is a function of a logical sequential process.
 - 2. Descriptions shall be clear and concise. Beginning and end shall be readily verifiable. Starts and finishes shall be scheduled by logical restraints.
 - 3. Responsibility shall be identified with a single performing entity.
 - 4. Additional codes shall identify building, floor, bid item and CSI classification.
 - 5. Assigned dollar value (cost-loading) of each activity shall cumulatively equal total contract amount. Mobilization, bond and insurance costs shall be separate. General requirement costs, overhead, profit, shall be prorated throughout all activities. Activity costs shall correlate with Schedule of Values.
 - 6. Each activity shall have manpower-loading assigned.
 - 7. Major construction equipment shall be assigned to each activity.
 - 8. Activities labeled start, continue or completion are not allowed.
- S. For major equipment and materials show a sequence of activities including:
 - 1. Preparation of shop drawings and sample submissions.
 - 2. Review of shop drawings and samples.
 - 3. Finish and color selection.

- 4. Fabrication and delivery.
- 5. Erection or installation.
- 6. Testing.
- T. Include a minimum of 15 days prior to completion date for punch lists and clean up. No other activities shall be scheduled during this period.

1.13 SHORT INTERVAL SCHEDULE

- A. Shall be fully developed horizontal bar-chart-type schedule directly derived from Construction Schedule.
- B. Prepare schedule on sheet of sufficient width to clearly show data.
- C. Provide continuous heavy vertical line identifying first day of week.
- D. Provide continuous subordinate vertical line identifying each day of week.
- E. Identify activities by same activity number and description as Construction Schedule.
- F. Show each activity in proper sequence.
- G. Indicate graphically sequences necessary for related activities.
- H. Indicate activities completed or in progress for previous 2 week period.
- I. Indicate activities scheduled for succeeding 2 week period.
- J. Further detail may be added if necessary to monitor schedule.

1.14 REQUESTED TIME ADJUSTMENT SCHEDULE

- A. Updated Construction Schedule shall not show a completion date later than the Contract Time, subject to any time extensions processed as part of a Change Order.
- B. If an extension of time is requested, a separate schedule entitled "Requested Time Adjustment Schedule" shall be submitted to Owner and Architect.
- C. Indicate requested adjustments in Contract Time which are due to changes or delays in completion of work.
- D. Extension request shall include forecast of project completion date and actual achievement of any dates listed in Agreement.
- E. To the extent that any requests are pending at time of any Construction Schedule update, Time Adjustment Schedule shall also be updated.
- F. Schedule shall be a time-scaled network analysis.

- G. Accompany schedule with formal written time extension request and detailed impact analysis justifying extension.
- H. Time impact analysis shall demonstrate time impact based upon date of delay, and status of construction at that time and event time computation of all affected activities. Event times shall be those as shown in latest Construction Schedule.
- I. Activity delays shall not automatically constitute an extension of Contract Time.
- J. Failure of subcontractors shall not be justification for an extension of time.
- K. Float is not for the exclusive use or benefit of any single party. Float time shall be apportioned according to needs of project.
- L. Float suppression techniques such as preferential sequencing, special lead/lag logic restraints, extended activity durations, or imposed dates shall be apportioned according to benefit of project.
- M. Extensions will be granted only to extent that time adjustments to activities exceed total positive float of the critical path and extends Contract completion date.
- N. Owner shall not have an obligation to consider any time extension request unless requirements of Contract Documents, and specifically, but not limited to these requirements are complied with.
- O. Owner shall not be responsible or liable for any construction acceleration due to failure of Owner to grant time extensions under Contract Documents should requested adjustments in Contract Time not substantially comply with submission and justification requirements of Contract for time extension requests.
- P. In the event a Requested Time Adjustment Schedule and Time Impact Analysis are not submitted within 10 days after commencement of a delay it is mutually agreed that delay does not require a Contract time extension.

1.15 RECOVERY SCHEDULE

- A. When activities are behind Construction Schedule a supplementary Recovery Schedule shall be submitted.
- B. Form and detail shall be sufficient to explain and display how activities will be rescheduled to regain compliance with Construction Schedule.
- C. Maximum duration shall be one month and shall coincide with payment period.
- D. Ten days prior to expiration of Recovery Schedule verification to determine if activities have regained compliance with Construction Schedule will be made. Based upon this verification the following will occur:
 - 1. Supplemental Recovery Schedule will be submitted to address subsequent payment period.

2. Construction Schedule will be resumed.

1.16 UPDATING SCHEDULES

- A. Review and update schedule at least 10 days prior to submitting an Application for Payment.
- B. Maintain schedule to record actual prosecution and progress.
- C. Approved change orders which affect schedule shall be identified as separate new activities.
- D. Change orders of less than \$20,000.00 value or less than 3 days duration need not be shown unless critical path is affected.
- E. No other revisions shall be made to schedule unless authorized by Owner.
- F. Provide narrative Progress Report at time of schedule update which details the following:
 1. Activities or portions of activities completed during previous reporting period.
 2. Actual start dates for activities currently in progress.
 3. Deviations from critical path in days ahead or behind.
 4. List of major construction equipment used during reporting period and any equipment idle.
 5. Number of personnel by craft engaged on Work during reporting period.
 6. Progress analysis describing problem areas.
 7. Current and anticipated delay factors and their impact.
 8. Proposed corrective actions and logic revisions for Recovery Schedule.
 9. Proposed modifications, additions, deletions and changes in logic of Construction Schedule.
- G. Schedule update will form basis upon which progress payments will be made.
- H. Owner will not be obligated to review or process Application for Payment until schedule and Progress Report have been submitted.

1.17 DISTRIBUTION

- A. Following joint review and acceptance of updated schedules distribute copies to Owner, Architect, and all other concerned parties.
- B. Instruct recipients to promptly report in writing any problem anticipated by projections shown in schedule.

**OC FAIR AND EVENT CENTER
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SHOWER & RESTROOM BUILDING**

7/15/25

DSA SUBMITTAL

END OF SECTION

SECTION 01 35 15

CALGREEN ENVIRONMENTAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Comply with CALGreen environmental requirements related to energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality.
 - 1. Comply with specific CALGreen requirements as adopted by authorities having jurisdiction and applicable to Project.

1.2 ENVIRONMENTAL REQUIREMENTS

- A. Mandatory Measures: Comply with CALGreen Mandatory Measures applicable to Project.
 - 1. Design team and construction team are each required to participate to maximum degree possible to achieve CALGreen environmental requirements.
 - 2. Contract Documents are not intended to limit alternative means of achieving environmental requirements.
 - a. Suggestions from Contractor, subcontractors, suppliers, and manufacturers for achieving environmental requirements are encouraged; team approach is also encouraged.
 - 3. Voluntary Tiers: Verify extent of Voluntary Tiers applicability to Project.
 - a. Construction team is encouraged to work with Owner and Design Team to incorporate additional measures as defined in CALGreen Appendixes.
 - b. Contact Owner and Architect regarding extent of intent of Project to reach Voluntary Tiers, additional work necessary to achieve enhanced Voluntary Tiers, and potential costs involved in achieving each Voluntary Tier.
 - c. Construction team is required to achieve Mandatory Measures and Voluntary Tiers as applicable, and to achieve as much as possible without unacceptable cost impact or schedule impact as determined by Owner.
- B. Requirements: Construction team is required to review CALGreen requirements relative to Project related to following.
 - 1. Energy Efficiency: Comply with California Energy Commission requirements.
 - 2. Water Efficiency and Conservation: Comply with requirements for both indoor and outdoor water use.
 - 3. Material Conservation and Resource Efficiency:

- a. Nonresidential Projects: Provide weather-resistant exterior wall and foundation envelope including prevention of landscape irrigation spray on structures (if any) and prevent water intrusion at exterior entries.
 - b. Residential Projects: Seal openings and penetrations in building envelope
Construction Waste:
 - c. Provide construction waste management plan as defined by CALGreen with demolition and construction waste diverted from landfill by recycling or salvage for reuse.
 - d. Nonresidential Projects Building Maintenance and Operation: Provide for commissioning requirements as required by CALGreen including but not limited to testing, documentation and training, testing and adjusting.
 - e. Residential Projects Building Maintenance and Operation: Provide operation and maintenance data as required by CALGreen.
4. Nonresidential Projects Environmental Quality: Comply with following as adopted by authorities having jurisdiction and as applicable to Project.
- a. Fireplaces: Comply with requirement for fireplaces (if any) to be direct-vent sealed-combustion gas type or sealed wood-burning fireplace, woodstove, or pellet stove.
 - b. Mechanical Equipment Pollution Control: Cover duct and related air distribution component openings to prevent dust and debris accumulation.
 - c. Finish Material Pollution Control: Comply with CALGreen requirements for volatile organic compound (VOC) emissions including but not necessarily limited to following (as applicable):
 - 1) Adhesives, sealants and caulks.
 - 2) Paints and coatings.
 - 3) Carpet systems including carpet, carpet cushion, and adhesives.
 - 4) Resilient flooring systems.
 - 5) Composite wood products formaldehyde limitations.
 - d. Filters: Comply with requirements for mechanically ventilated buildings to have air filtration media for outside and return air prior to occupancy.
 - e. Environmental Tobacco Smoke (ETS) Control: Comply with CALGreen requirements for ETS.
 - f. Interior Moisture Control: Comply with California Building Code requirements and CALGreen requirements for vapor retarder at concrete slab foundations and capillary break (aggregate base).
 - g. Building Material Moisture Content: Do not use water damaged building materials, remove and place wet and high moisture content insulation, and do not enclose wall or floor framing when moisture content exceeds 19%.

- h. Indoor Air Quality: Comply with CALGreen requirements for outside air delivery and carbon dioxide monitoring.
 - i. Environmental Comfort: Comply with CALGreen requirements for whole acoustical control and interior sound control.
 - j. Outdoor Air Quality: Comply with CALGreen requirements for reduction of greenhouse gases and ozone depletion.
- 5. Residential Projects Environmental Quality:
 - a. Fireplaces: Comply with requirement that gas fireplaces (if any) shall be direct-vent sealed-combustion type and woodstoves or pellet stoves (if any) comply with U.S. EPA Phase II emissions limits.
 - b. Mechanical Equipment Pollution Control: Cover duct and related air distribution component openings to prevent dust and debris accumulation.
 - c. Finish Material Pollution Control: Comply with CALGreen requirements for volatile organic compound (VOC) emissions including but not necessarily limited to following (as applicable):
 - 1) Adhesives, sealants and caulks.
 - 2) Paints and coatings.
 - 3) Carpet systems including carpet, carpet cushion, and adhesives.
 - 4) Resilient flooring systems.
 - 5) Composite wood products formaldehyde limitations.
 - d. Interior Moisture Control: Comply with CALGreen requirements for vapor retarder at concrete slab foundations and capillary break (aggregate base).
 - e. Building Material Moisture Content: Do not use water damaged building materials, remove and place wet and high moisture content insulation, and do not enclose wall or floor framing when moisture content exceeds 19%.
 - f. Indoor Air Quality: Provide humidistat-controlled bathroom exhaust fans with Energy Star compliance, ducted to terminate outside building.
 - g. Environmental Comfort: Comply with CALGreen requirements for whole house exhaust fan louvers to be insulated or have covers which close when fan is off, and with heating and air-conditioning system design requirements.
- C. Planning and Design: Construction team shall coordinate with Design Team regarding Project Planning and Design methods related to CALGreen requirements related to Project design and shall comply with requirements related to construction.

1.3 QUALITY ASSURANCE

- A. Project Management and Coordination: Contractor to identify one person on Contractor's staff to be responsible for CALGreen issues compliance and coordination.

1. Experience: Environmental project manager to have experience relating to CALGreen building construction.
 2. Responsibilities: Carefully review Contract Documents for CALGreen issues, coordinate work of trades, subcontractors, and suppliers; instruct workers relating to environmental issues; and oversee Project Environmental Goals.
 - a. Submittals: Collect, compile, verify, and maintain sufficient information for submittals indicating compliance with applicable CALGreen requirements.
 3. Meetings: Discuss CALGreen Goals at following meetings.
 - a. Pre-construction meeting.
 - b. Pre-installation meetings.
 - c. Regularly scheduled job-site meetings.
- B. CALGreen Issues Criteria: Comply with requirements listed in CALGreen and various Specification sections.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General Issues: Do not use materials with moisture stains or with signs of mold or mildew.
1. Moisture Stains: Materials that have evidence of moisture damage, including stains, are not acceptable, including both stored and installed materials; immediately remove from site.
 2. Mold and Mildew: Materials that have evidence of growth of molds or of mildew are not acceptable, including both stored and installed materials; immediately remove from site.

2.2 SUBSTITUTIONS

- A. Substitutions Environmental Issues: Requests for substitutions shall comply with requirements specified in Section 01 25 00 – Substitution Procedures, with following additional information required where environmental issues are involved.
1. Indicate each proposed substitution complies with CALGreen requirements.
 2. Owner and Architect reserve right to reject proposed substitutions where CALGreen information is not provided and where substitution may impact mandatory requirements or Project voluntary tier requirements.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Environmental Issues: Protect interior materials from water damage; where interior products not intended for wet applications are exposed to moisture, immediately remove from site.
 - 1. Protect installed products using methods that do not support growth of molds and mildews. Immediately remove from site materials with mold and materials with mildew.

END OF SECTION

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes general quality control requirements.
 - 1. General quality control.
 - 2. Manufacturers' field services.
 - 3. Mock-ups.
 - 4. Independent testing laboratory services and inspections.
- B. Related Requirements:
 - 1. Refer to applicable codes and Specifications sections for test requirements.

1.2 QUALITY CONTROL, GENERAL

- A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.3 MANUFACTURER'S FIELD SERVICES

- A. When specified in respective Specification sections, require manufacturer or supplier to have qualified personnel provide on-site observations and recommendations.
 - 1. Observe field conditions, including conditions of surfaces and installation.
 - 2. Observe quality of workmanship.
 - 3. Provide recommendations to assure acceptable installation and workmanship.
 - 4. Where required, start, test, and adjust equipment as applicable.
- B. Representative shall submit written report to Architect or Owner listing observations and recommendations.

1.4 MOCK-UPS

- A. Erect field samples and field mock-ups at locations on site as approved in advance and in accordance with requirements where included in Specifications section.
 - 1. Test mock-ups requiring special equipment may be erected at location having access to necessary equipment; coordinate with Architect.
- B. Approved field samples and mock-ups may be used as part of Project.

1.5 TESTING LABORATORY SERVICES AND INSPECTIONS

- A. Testing laboratory services and inspections specified and required by applicable codes and regulations will be performed by firms independent of firms related to construction operations and shall be acceptable to applicable authorities.
 - 1. Notify Owner immediately where potential conflict of interest may be involved with testing laboratories or inspection services for Project.
 - 2. Owner or Architect may also require independent testing of items where doubts exist that product or system does not conform to Contract Documents.
 - 3. Owner will employ and pay for testing laboratory and special inspectors to provide Project specific testing and inspections under applicable codes and Specification sections except where indicated otherwise.
 - a. Owner employment of testing laboratory and inspectors shall not relieve Contractor of obligation to perform Work in accordance with requirements of applicable codes and Contract Documents.
 - 1) Laboratory and inspectors may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - b. Retesting required because of non-conformance to specified requirements shall be performed by Owner's testing laboratory.
 - 1) Payment for retesting shall be charged to Contractor by deducting inspection and testing charges from Contract amount.
 - c. Owner provided testing shall be limited to Project specific testing and shall not include general tests or approvals of materials, equipment or systems.
 - d. Owner provided inspections shall be limited to Project design team inspections and special inspectors required by applicable authorities.
- B. Services shall be performed in accordance with requirements of governing authorities and with specified standards.
- C. Reports will be submitted to Architect in duplicate giving observations and results of tests and inspections, indicating compliance or non-compliance with specified standards and with Contract Documents.
 - 1. Where required, testing laboratory and inspectors will submit copy of tests and inspections directly to enforcing agency.
- D. Contractor shall cooperate with testing laboratory and inspection personnel; furnish tools, samples of materials, design mix, equipment, storage and assistance as requested.
 - 1. Notify Owner, Architect, inspectors, and testing laboratory sufficiently in advance of expected time for operations requiring inspection and testing services.

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END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes temporary construction facilities and temporary controls.
 - 1. Electricity and lighting.
 - 2. Heat and ventilation.
 - 3. Water and sanitary facilities.
 - 4. Construction aids.
 - 5. Temporary enclosures.
 - 6. Barriers.
 - 7. Cleaning during construction.
 - 8. Project identification.
 - 9. Field offices.
 - 10. Cellular telephone service.
 - 11. Storage.
- B. Related Requirements:
 - 1. Section 01 70 00: Progress cleaning and final cleaning.
 - 2. Section 01 74 10: Waste management.
- C. Provide temporary construction facilities and temporary controls as required to conform to applicable authorities and as required to complete Project in accordance with Contract Documents.
 - 1. Authorities: Contact governing authorities to establish extent of temporary facilities and temporary controls required by authorities.

1.2 ELECTRICITY AND LIGHTING

- A. Provide electrical service required for construction operations, with branch wiring and distribution boxes located to allow service and lighting by means of construction-type power cords.
 - 1. Connection to existing electrical service is permitted.
- B. Provide lighting for construction operations.
 - 1. Permanent lighting may be used during construction; maintain lighting and make routine repairs.
- C. Owner will pay costs of energy used from existing on-site services.

1.3 HEAT AND VENTILATION

- A. Provide heat and ventilation as required to maintain specified conditions for construction operation, to protect materials and finishes from damage due to temperature and humidity.
- B. Owner will pay costs of energy used from existing on-site services.

1.4 WATER AND SANITARY FACILITIES

- A. Provide water service required for construction operations; extend branch piping with outlets located so water is available by use of hoses.
 - 1. Connection to existing facilities is permitted.
 - 2. Owner will pay for water used from existing on-site services.
- B. Provide and maintain required sanitary facilities and enclosures.

1.5 CONSTRUCTION AIDS

- A. Noise, Dust and Pollution Control: Provide materials and equipment necessary to comply with local requirements for noise, dust and pollution control.
- B. Fire Protection: Maintain on-site fire protection facilities as required by applicable authorities and insurance requirements.
- C. Security: Protect Site and Work; prevent unauthorized entry, vandalism, and theft.
 - 1. Coordinate with Owner's security program.
- D. Dewatering: Provide and operate drainage and pumping equipment; maintain excavations and site free of standing water.

1.6 ENCLOSURES

- A. Temporary Closures: Provide temporary weather-tight closures for exterior openings for acceptable working conditions, for protection for materials, to protect interior materials from dampness, for temporary heating, and to prevent unauthorized entry.
 - 1. Provide doors with self-closing hardware and locks.
- B. Temporary Partitions: Provide temporary partitions as required to separate work areas from completed areas, to prevent penetration of dust and moisture into completed areas, and to prevent damage to finished areas and installed equipment.
 - 1. Construction: Framing and sheet materials with closed joints and sealed edges at intersections with existing surfaces; Flame Spread Rating of 25 in accordance with ASTM E84.

1.7 BARRIERS

- A. Barriers: Provide barriers as required to prevent public entry to construction areas and to protect adjacent properties from damage from construction operations.
 - 1. Fence: Provide minimum 8-foot high commercial grade chain link or painted solid wood fence around construction site; equip with gates with locks.
 - 2. Covered Walkways: Provide lighted covered painted walkways as required by governing authorities for public rights-of-way and for public access to existing building.
- B. Barricades: Provide barricades as required by governing authorities.
- C. Tree Protection: Provide barriers around trees and plants designated to remain; protect against vehicular traffic, stored materials, dumping, chemically injurious materials, and puddling or continuous running water.

1.8 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; recycle or dispose of off-site.
- B. Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

1.9 PROJECT IDENTIFICATION

- A. Project Sign: Provide minimum 32-square foot Project identification sign of wood frame and exterior grade plywood construction, painted, with computer generated graphics by professional sign maker.
 - 1. Design: As furnished by Architect.
 - 2. Submit to Owner and Architect additional names or changes proposed to Project sign for prior written approval.
 - 3. Erect on site at location established by Architect.
- B. Other Signs: Subject to approval of Architect and Owner.

1.10 FIELD OFFICES

- A. Field Office: Provide weather-tight field office, with lighting, electrical outlets, data outlets, heating, and ventilating equipment, and equipped with furniture.
 - 1. Meeting Space: In addition, provide space for Project meetings with table and chairs to accommodate minimum six persons.
 - 2. Telephone Service: Provide telephone service to field office.

3. Multi-Purpose Copier: Provide plain paper multi-purpose color and black-and-white copier with enlargement and reduction capability and with built-in printer, scanner, and facsimile capabilities.

1.11 CELLULAR TELEPHONE SERVICE

- A. Cellular Telephone Service: Furnish on-site Project Managers with cellular telephone. Ensure Owner and Architect ability to contact site during construction operations.
 1. Schedules: Submit schedules of on-site Project Managers with individual cellular telephone numbers to Owner and Architect; maintain schedules and cell phone numbers up to date during Project on-site operations.

1.12 STORAGE

- A. Storage for Tools, Materials, and Equipment: Limit on-site storage to Project area; provide weather-tight storage, with heat and ventilation for products requiring controlled conditions.
 1. Maintain adequate space for organized storage and access.
 2. Provide lighting for inspection of stored materials.

1.13 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion Inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities.
- C. Restore existing facilities used during construction to specified or original condition.

END OF SECTION

SECTION 01 56 39

TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the protection and trimming and root pruning of trees that interfere with, or are affected by, execution of the Work, whether temporary or new construction.

1.2 SUBMITTAL

- A. The Contractor's representatives and employees shall be experienced in landscape maintenance.
- B. Certification from a qualified arborist that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
- C. Maintenance recommendation from a qualified arborist for care and protection of trees affected by construction during and after completing the Work.

1.3 QUALITY ASSURANCE

- A. Arborist Qualifications: An arborist certified by the International Society of Arboriculture or licensed in the jurisdiction where the Project is located.
- B. Tree Pruning Standards: Comply with ANSI A300, "Trees, Shrubs, and Other Woody Plant Maintenance--Standard Practices," unless more stringent requirements are indicated.
- C. Pre-installation Conference: Before starting tree protection and trimming, meet with representatives of authorities having jurisdiction, Owner, Landscape Architect, consultants, and other concerned entities. Review tree protection and trimming procedures and responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Drainage Fill: Selected crushed stone, or crushed or uncrushed gravel, washed, ASTM D 448, Size 24, with 90 to 100 percent passing a 2-1/2-inch sieve and not more than 10 percent passing a 3/4-inch sieve.
- B. Topsoil: Fertile, friable, surface soil, containing natural loam and complying with ASTM D 5268. Provide topsoil that is free of stones larger than 1 inch in any dimension and free of other extraneous or toxic matter harmful to plant growth.

Obtain topsoil only from well-drained sites where soil occurs in depth of 4 inches or more; do not obtain from bogs or marshes.

- C. Filter Fabric: Manufacturer's standard, non-woven, pervious, geotextile fabric of polypropylene, nylon, or polyester fibers.
- D. Chain Link Fence: Metallic-coated steel chain link fence fabric, 0.120-inch- diameter wire size; 72 inches high, minimum; line posts, 1.9 inches in diameter; terminal and corner posts, 2-3/8 inches in diameter; top rail, 1-5/8 inches in diameter; bottom tension wire, 0.177 inch in diameter; with tie wires, hog ring ties, and other accessories for a complete fence system.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before construction begins, fertilize affected trees to improve tree vigor and health. Soil analysis testing should be completed to ensure fertilization with the appropriate fertilizer products.
- B. Temporary Fencing: Install temporary fencing located at or outside the drip line of trees.
- C. Protect tree root systems from damage due to noxious materials caused by runoff or spillage while mixing, placing, or storing construction materials. Protect root systems from flooding, eroding, or excessive wetting caused by dewatering operations.
- D. Do not store construction materials, debris, or excavated material within the drip line of remaining trees. Do not permit vehicles or foot traffic within the drip line; prevent soil compaction over root systems.
- E. Do not allow fires under or adjacent to remaining trees or other plants.

3.2 EXCAVATION

- A. Do not excavate within drip line of trees.
- B. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow tine spading forks and comb soil to expose roots.
 - 1. Cut roots approximately 3 inches back from new construction.
 - 2. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Protect roots from damage until they are permanently relocated and covered with soil.
 - 3. Where utility trenches are required within drip line of trees, tunnel under or around roots by drilling, auger boring, pipe jacking, or digging by hand.

4. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments; do not break or chop.

3.3 TREE PRUNING

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.
- B. Root prune existing street trees to prevent sidewalk and curb damage.
- C. Prune remaining trees to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by qualified arborist.
- D. Pruning Standards: Prune trees according to ANSI A300 as follows:
 1. Crown cleaning.
 2. Crown thinning.
 3. Crown reduction.

3.4 TREE REPAIR AND REPLACEMENT

- A. Promptly repair trees damaged by construction operations within 24 hours. Treat damaged trunks, limbs, and roots according to written instructions of the qualified arborist.
- B. Remove and replace dead and damaged trees that the qualified arborist determines to be incapable of restoring to a normal growth pattern.
- C. Provide new trees of the same size and species as those being replaced; plant and maintain as specified in Division 2 Section "Planting."

3.5 SOIL AERATION

- A. Aerate surface soil compacted during construction, 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch- diameter holes a minimum of 12 inches deep at 24 inches on center. Backfill holes with an equal mix of augured soil and sand.

3.6 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material, displaced trees, and excess chips from Owner's property.

END OF SECTION

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes basic product requirements governing material and equipment.
 - 1. General product requirements.
 - 2. Product list.
 - 3. Quality assurance.
 - 4. Delivery, storage, and handling.
- B. Related Requirements:
 - 1. Section 01 25 00: Substitution procedures.
 - 2. Section 01 30 00: Submittal of manufacturers' certificates.
 - 3. Section 01 77 00: Operation and maintenance data.

1.2 GENERAL PRODUCTS REQUIREMENTS

- A. Products include material, equipment, and systems.
- B. Comply with Specifications, referenced standards, and applicable codes and regulations as minimum requirements.
- C. Provide new materials except as specifically allowed by Contract Documents.
- D. Materials to be supplied in quantity within a Specification section shall be by one manufacturer, shall be the same, and shall be interchangeable.
- E. Provide equipment and systems composed of materials from a single manufacturer except where otherwise recommended by equipment or systems manufacturer or where otherwise indicated in Contract Documents.
- F. Contractor's Options: Comply with following options; requests for substitutions for named manufacturers and products shall comply with requirements specified in Section 01 25 00 – Substitution Procedures.
 - 1. Products Identified by Reference Standards: Select product meeting referenced standard for products specified only by reference standard.
 - a. Requests for Substitutions to be limited to products not complying with referenced standards.
 - 1) Submit justification for non-compliance with reference standards as part of Request for Substitutions; if product is foreign made submit rationale why foreign standards and basic materials indicates compliance.

2. **Named Manufacturers:** Where names of manufacturers are specified select any named manufacturer product meeting Specifications for products specified by naming one or more manufacturers.
 - a. Submit Request for Substitution for any manufacturer not named.
 3. **Named Manufacturers and Named Products:** Select any named manufacturer named product meeting Specifications for products specified by naming one or more manufacturers and products.
 - a. Where only one manufacturer and product is named together with additional manufacturers without specific products, Requests for Substitutions to be limited to products not comparable to that specified.
 - 1) Contractors, subcontractors, suppliers, and manufacturers shall take special care to ensure comparable products are being supplied based on design, performance, quality, and longevity.
 - 2) Substitutions: Submit Request for Substitution for any manufacturer not named and for products not comparable to those specified in design, performance, quality, and longevity.
 4. **Basis of Design:** Where manufacturer or manufacturer and product both are indicated as Basis of Design, submit Request for Substitution for other manufacturers and products.
 5. **“Or Equal” Clauses:** Submit request for substitution for manufacturer or product not specifically named in Specifications where terms "or equal", "or approved equal", or similar references are made.
- G. **Nameplates:** Do not attach or imprint manufacturer or producer nameplates on exposed surfaces in occupied spaces except for required labels and operating data.
1. **Equipment Nameplates:** Provide permanent nameplate on service connected and power operated equipment located on easily accessible surface inconspicuous in occupied spaces.
 - a. Provide name of product and manufacturer, model and serial number, capacity, speed, rating, and similar information.

1.3 SUBMITTALS

- A. **Product List:** Within 35 days after award of Contract, submit to Owner and Architect a complete list of major products proposed for installation, with name of manufacturer, trade name, and model.
- B. **Product List:** Prior to submittal of second Request for Payment, submit to Architect complete list of major products which are proposed for installation, with name of manufacturer, trade name, and model.

1. Tabulate products by Specification number and title.

C. Substitutions: Refer to Section 01 25 00 – Substitution Procedures.

1.4 QUALITY ASSURANCE

- A. Comply with industry standards and applicable codes except when more restrictive tolerances or requirements indicate more rigid standards or precise workmanship.
- B. Perform work by persons qualified to produce workmanship of specified quality.
- C. Install products straight, true-to-line, and in correct relationship to adjacent materials, with hairline joints, free of rough, sharp and potentially hazardous edges.
- D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1. Seismic Anchors: Conform to code requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Transport products by methods to avoid product damage, deliver in undamaged condition in manufacturer's unopened containers or packaging.
 - B. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible.
 - C. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
 - D. For exterior storage of fabricated products, place on sloped supports above ground.
 - E. Store loose granular materials on solid surfaces in a well-drained area; prevent mixing with foreign matter.
 - F. Arrange storage to provide access for inspection; periodically inspect to assure products are undamaged and are maintained under required conditions.
 - G. Provide equipment and personnel to handle products by methods to prevent soiling and prevent damage.
 - H. Promptly inspect shipments to assure products comply with requirements, quantities are correct, and products are undamaged.
 - I. Immediately remove from Project products damaged, wet, stained, and products with mold and products with mildew.
1. Take special care to prevent absorbent products such as gypsum board and acoustical ceiling units from becoming wet.

END OF SECTION

SECTION 01 70 00

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes execution requirements.
 - 1. Installer qualifications.
 - 2. Examination.
 - 3. Manufacturer's instructions.
 - 4. Installation.
 - 5. Cleaning.
 - 6. Protection.
- B. Related Requirements:
 - 1. Section 01 50 00: Cleaning during construction.
 - 2. Section 01 77 00: Closeout procedures.
 - 3. Section 01 79 00: Demonstration and training.

1.2 INSTALLER QUALIFICATIONS

- A. Experienced Installers: Installers to have minimum five-years successful experience installing items like those required for Project, except for individuals in training under direct supervision of experienced installer.

1.3 EXAMINATION

- A. Acceptance of Conditions: Beginning installation of a product signifies installer has examined substrates, areas, and conditions for compliance with manufacturer requirements for tolerances and other conditions affecting performance.
- B. Field Measurements: Take field measurements as required to fit Work properly; recheck measurements prior to installing each product.
 - 1. Where portions of Work are to fit to other construction verify dimensions of other construction by field measurements before fabrication; allow for cutting and patching to avoid delaying Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

1.4 MANUFACTURERS' INSTRUCTIONS

- A. Manufacturer's Recommendations: When work is specified to comply with manufacturers' recommendations or instructions, distribute copies to persons involved and maintain one set in field office.
 - 1. Conform to requirements specified in Section 01 30 00 for submittal of recommendations or instructions to Architect; submit to Architect only where specified or where specifically requested; otherwise keep in Field Office.
- B. Perform work in accordance with details of recommendations and instructions and specified requirements.
 - 1. Should a conflict exist between Specifications and recommendations or instructions consult with Architect.
- C. Where manufacturer's information notes special recommendations in addition to installation instructions, comply with both recommendations and instructions.

1.5 INSTALLATION

- A. Pre-Installation Meetings: Installers and suppliers are to attend pre-installation meetings scheduled by Contractor.
- B. Comply with manufacturers written recommendations and installation instructions unless more restrictive requirements are specified.
- C. Locate Work and components accurately, in correct alignment and elevation.
 - 1. Make vertical work plumb and horizontal work level.
 - 2. Install components to allow space for maintenance and ease of removal for replacement.
- D. Install products at time and under conditions to ensure best possible results; maintain conditions required for product performance until Substantial Completion.
- E. Conduct operations so no part of Work is subject to damaging operations or excessive loads during normal conditions.
- F. Securely anchor permanent construction in place, accurately located and aligned with other portions of Work.
- G. Allow for building movement including thermal expansion and contraction.
- H. Make joints of uniform width; arrange joints as indicated, for best visual effect where not otherwise indicated; fit exposed connections together to form hairline joints except where otherwise indicated.

1.6 CLEANING

- A. Cleaning During Construction: Specified in Section 01 50 00 - Temporary Facilities and Controls.
- B. Progress Cleaning: Keep installed areas clean using cleaning materials specifically recommended by manufacturers of product being cleaned; where not otherwise recommended use nontoxic materials that will not damage surfaces.
 - 1. Remove debris from concealed spaces before enclosing space.
 - 2. Supervise construction operations to assure no part of construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.
- C. Final Cleaning: Execute final cleaning at Substantial Completion.
 - 1. Clean interior and exterior surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces.
 - a. Vacuuming Equipment: Type with high efficiency particulate arrestor (HEPA) type filters; properly maintained.
 - 2. Clean equipment and fixtures to a sanitary condition, clean filters of mechanical equipment, replace filters where cleaning is impractical.
 - a. Clean ducts.
 - 3. Clean site; sweep paved areas.
 - 4. Remove waste, surplus materials and rubbish from Project and site; recycle to maximum extent feasible.

1.7 PROTECTION

- A. Protect products subject to deterioration with impervious cover. Provide ventilation to avoid condensation and trapping water.
- B. Take care to use protective covering and blocking materials that do not soil, stain, or damage materials being protected.
- C. After installation, provide coverings to protect products from damage from traffic and construction operations, remove when no longer needed.
- D. Protect interior materials from water damage; immediately remove wet materials from site to prevent growth of mold and mildew on site.

END OF SECTION

SECTION 01 73 00

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Contractor is responsible for cutting, fitting and patching to complete Work and to:
1. Make its parts fit together properly.
 2. Uncover work to provide for installation of ill-timed work.
 3. Remove and replace defective work.
 4. Remove and replace work not conforming to Contract Documents.
 5. Remove samples of installed work as required for testing.
 6. Provide routine penetrations of non-structural surfaces for installation of piping.
 7. Provide routine penetrations of non-structural surfaces for installation of conduit.
 8. Provide pathways through existing finishes in existing building and repair those finishes after installation of piping or conduit.
- B. Related Requirements:
1. Section 01 50 00: Temporary facilities and controls.
 2. Section 02 41 00: Structure demolition.
 3. Section 02 41 20: Selective building demolition for remodeling.

1.2 SUBMITTALS

- A. Submit written request well in advance of cutting or alteration which affects:
1. Work of Owner or separate contractor.
 2. Structural value or integrity of any element of Project.
 3. Integrity of weather-exposed or moisture-resistant elements.
 4. Efficiency, operational life, maintenance or safety of operational elements.
 5. Visual qualities of sight-exposed elements.
- B. Request shall include:
1. Identification of Project and description of affected work.
 2. Necessity for cutting or alteration.
 3. Effect on work of Owner or separate contractor.
 4. Effect on structural integrity, or weatherproof integrity of Project.
 5. Alternatives to cutting and patching.
 6. Cost proposal, when applicable.
 7. Written permission of separate contractor whose work will be affected.
 8. Description of proposed work including:
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Products proposed to be used.
 - c. Extent of refinishing to be included.

- C. Should conditions of Work or schedule indicate a change of products from original installation, Contractor shall submit request for substitution as specified in Section 01 25 00 – Substitution Procedures.
- D. Submit written notice to Architect designating date and time work will be uncovered.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with Specifications and standards for each specific product involved.
- B. Where Specifications and standards have not been provided, provide materials and fabrication consistent with quality of Project and intended for commercial construction.
- C. Provide new materials for cutting and patching unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Inspect existing conditions of Project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of products, or performance of work.
- C. Report unsatisfactory or questionable conditions to Architect in writing; do not proceed with work until Architect has provided further instructions.

3.2 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of Work.
 - 1. Provide services of licensed engineer for designing temporary support where required by applicable authorities for temporary supports and for shoring; submit engineering calculations directly to applicable authorities upon request.
- B. Protect other portions of Project from damage.

3.3 PERFORMANCE

- A. Execute cutting by methods that provide proper surfaces to receive installation of repairs and finishes.
 - 1. Execute excavating and backfilling by methods which will prevent settlement, and which will prevent damage to other work.
- B. Employ same installer or fabricator to perform cutting and patching work as employed for new construction for:

1. Weather-exposed or moisture resistant elements.
2. Sight-exposed finished surfaces.
- C. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Restore work that has been cut or removed; install new products to provide completed Work in accordance with requirements of Contract Documents.
- E. Fit work tight to pipes, sleeves, ducts, conduit and penetrations through surfaces.
- F. Refinish entire surfaces as necessary to provide even finish to match adjacent finishes:
 1. For continuous surfaces, refinish to nearest intersection.
 2. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01 74 10

WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Project requires special Waste Management Program.
 - 1. LEED Waste Management Goals: As required for level listed in Section 01 35 10.
 - 2. CALGreen Waste Management: As required in Section 01 35 15.
 - 3. Provide itemization of costs related to Waste Management Program.
 - 4. Effect optimum control of solid wastes.
 - 5. Prevent environmental pollution and damage.
- B. Related Work:
 - 1. Section 01 35 10: LEED certification requirements.
 - 2. Section 01 35 15: CALGreen environmental requirements.
 - 3. Section 01 50 00: Temporary facilities and controls.

1.2 DEFINITIONS

- A. Inert Fill: A permitted facility that accepts inert waste such as asphalt and concrete exclusively.
- B. Class III Landfill: A landfill that accepts non-hazardous waste such as household, commercial, and industrial waste, including construction, remodeling, repair, and demolition operations.
- C. Construction and Demolition Waste: Includes solid wastes, such as building materials, packaging, rubbish, debris, and rubble resulting from construction, remodeling, repair, and demolition operations.
 - 1. Rubbish: Includes both combustible and noncombustible wastes, such as paper, boxes, glass, crockery, metal and lumber scrap, tin cans, and bones.
 - 2. Debris: Includes both combustible and noncombustible wastes, such as leaves and tree trimmings that result from construction or maintenance and repair work.
- D. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalis, herbicides, pesticides, organic chemicals and inorganic wastes.
- E. Sanitary Wastes:
 - 1. Garbage: Refuse and scraps resulting from preparation, cooking, distribution, or consumption of food.
 - 2. Sewage: Domestic sanitary sewage.

1.3 SUBMITTALS

- A. Waste Management Program: Comply with Contract Documents and applicable code requirements for salvaging, recycling, and disposing of nonhazardous waste.
 - 1. Prior to commencement of Work, schedule and conduct meeting with Owner and Architect to discuss proposed Waste Management Program.
 - 2. Develop mutual understanding relative to details of recycling, and rebate programs.
 - 3. Prepare and submit a written and graphic Waste Management Program including, but not limited to, the following:
 - a. Indicate procedures to be implemented.
 - b. Estimate total Project waste to be generated, and estimated cost of disposing of Project waste in landfills.
 - c. Estimate total cubic yards of following waste categories to be diverted from landfill.
 - 1) Clean dimensional wood, palette wood.
 - 2) Plywood, oriented strand board, and medium density fiberboard.
 - 3) Cardboard, paper, packaging.
 - 4) Other items as directed by Owner and Architect.
 - d. Estimate amounts of following waste categories in appropriate units (weight, feet, square yards, gallons).
 - 1) Metals.
 - 2) Gypsum board.
 - 3) Carpet.
 - 4) Paint.
 - 5) Other items as directed by Owner and Architect.
 - e. Submit permit or license and location of waste disposal areas.
 - f. Submit procedures for recycling/re-use program.
 - g. Submit procedures for rebate programs.
 - h. Revise and resubmit Waste Management Program as required by Owner and Architect.
 - 1) Review of Contractor's Waste Management Program will not relieve Contractor of responsibility for control of pollutants and other environmental protection measures.

- B. Submit summary of solid waste generated by Project with each application for progress payment, on form acceptable to Owner and Architect; include manifests, weight tickets, receipts, and invoices identifying Project and waste delivered to following locations.
 - 1. Recycling Centers.
 - 2. Class III landfills.
 - 3. Inert fills.
- C. Prepare rebate information and product documentation as required for Owner to qualify for rebate programs; submit with final closeout submittals.
 - 1. Where feasible submit in electronic format, otherwise in 3-ring binder.

1.4 RECYCLING PROGRAM

- A. Recycling: Implement recycling program that includes separate collection of waste materials of following types as applicable to Project requirements; recycling program to be applied by Contractors and subcontractors.
 - 1. Land clearing debris.
 - 2. Asphaltic concrete.
 - 3. Concrete.
 - 4. Masonry materials.
 - 5. Ferrous metal.
 - 6. Non-ferrous metal.
 - 7. Clean dimensional wood and palette wood.
 - 8. Plywood, oriented strand board, and medium density fiberboard.
 - 9. Paper - bond.
 - 10. Paper - newsprint.
 - 11. Cardboard and paper packaging materials.
 - 12. Glass.
 - 13. Plastics.
 - 14. Gypsum board (unpainted).
 - 15. Paint.
 - 16. Rigid foam.
 - 17. Carpet and pad.
 - 18. Beverage containers.
 - 19. Porcelain plumbing fixtures.
 - 20. Insulation.
 - 21. Others as appropriate.
- B. Handling: Keep materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to recycling process.
 - 1. Clean materials contaminated prior to placing in collection containers.
 - 2. Arrange for collection by or delivery to appropriate recycling center or transfer station that accepts construction and demolition waste for purpose of recycling.
- C. Participate in Re-Use Programs: Rebates, tax credits, and other savings obtained for recycled or re-used materials shall accrue to Contractor.

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END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. This section describes Contract closeout procedures.
 - 1. Substantial Completion.
 - 2. Final Completion.
 - 3. Project record documents.
 - 4. Material and finish data.
 - 5. Operation and maintenance manuals.
- B. Related Requirements:
 - 1. Section 01 30 00: Administrative requirements including attic stock.
 - 2. Section 01 78 00: Warranties.
 - 3. Section 01 79 00: Demonstration and training.

1.2 SUBSTANTIAL COMPLETION

- A. Immediately prior to Substantial Completion, schedule agency reviews as required for “temporary certificate of occupancy” or for “certificate of occupancy”.
- B. When Contractor considers Work, or a designated portion thereof is substantially complete, submit written notice, with list of items to be completed or corrected.
 - 1. List (“Punch List”): Format pre-approved by Owner and Architect; tabular form with each space listed required.
- C. Within a reasonable time, Owner and Architect will inspect status of completion and may add to “Punch List”.
 - 1. Contractor shall pay for Architect's time and direct expenses where more than one Substantial Completion inspection is required.
- D. Should Owner and Architect determine Work is not substantially complete, Contractor will be promptly notified in writing, giving reasons.
- E. Contractor shall remedy deficiencies and send a second written notice of substantial completion; Architect will reinspect Work.
 - 1. Contractor shall pay for Architect's time and direct expenses where more than one Substantial Completion inspection is required.
- F. When Work is determined to be substantially complete by Architect, a Certificate of Substantial Completion will be prepared in accordance with General Conditions.

- G. DSA Projects: Contractor shall complete DSA 6-C Form and upload electronically to DSABOX within three days of completion of Work.

1.3 FINAL COMPLETION

- A. When Work is complete, submit written certification indicating:
 - 1. Work has been inspected for compliance with Contract Documents.
 - 2. Work has been completed in accordance with Contract Documents and deficiencies listed (in 'Punch List') with Certificate of Substantial Completion have been corrected.
 - 3. Equipment and systems have been tested in presence of Owner's representative and are operational.
 - 4. Work is complete and ready for final inspection.
- B. Special Submittals: In addition to submittals required by Contract, submit following.
 - 1. Provide submittals required by governing authorities to governing authorities with copies included in Project Record Documents.
 - 2. Submit final statement of accounting giving total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 PROJECT RECORD DOCUMENTS

- A. Keep documents current; do not permanently conceal any work until required information has been recorded.
 - 1. Owner will provide Contractor with a separate set of Drawings to maintain for Project Record Documents.
 - 2. Store reproducible Drawings, one set of Project Manual, and one copy of each Change Order separate from documents used for construction, for use as Project Record Documents.
 - 3. Indicate actual work on Drawings; indicate actual products used in Project Manual, including manufacturer, model number and options.
 - 4. Update Project Record Documents daily and allow for Architect inspection at least once a month.
- B. At Contract close-out submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.
- C. As-Built Documents: General Contractor shall have electronic "As Built" sets of Contract Documents (Project Drawings and Project Specifications) prepared prior to Final Completion.

1. Contractor shall use one complete electronic set of Contract Documents (Drawings and Specifications) for use for “As-Builts”.
 2. As-Built Drawings: Revise Drawings based on Record Documents and field measurements made after installation and indicate actual locations of structural elements, ducts, piping, wiring, and equipment.
 - a. Professional draftspersons experienced in electronic media used for Contract Documents shall revise original Project Drawings based on information recorded on Project Record Documents.
 3. As-Built Specifications: Revise Specifications to indicate manufacturers who provided materials specified along with specifics indicating accessories, options, and finishes used in Project.
 - a. Cross referencing Submittal records is acceptable for accessories only.
 4. Review Submittal: Submit two copies of electronic media of “As-Built” Documents to Architect for review.
 - a. After Architect review, revise where indicated and submit final electronic media to Owner.
- D. Final Completion Submittal: At Project Completion submit both Project Record Documents and As-Built Documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

1.5 MATERIAL AND FINISH DATA

- A. Provide data for primary materials and finishes.
- B. Submit two sets prior to final inspection, bound in 8-1/2" by 11" three-ring binders with durable plastic covers, clearly identified regarding extent of contents.
 1. Electronic Format: Where available in electronic format, submit USB 3.0 flash drives with information required for material and finish data.
- C. Arrange by Specification division and give names, addresses, and telephone numbers of subcontractors and suppliers. List:
 1. Trade names, model or type numbers.
 2. Cleaning instructions.
 3. Product data.
 4. Maintenance recommendations.

1.6 OPERATION AND MAINTENANCE MANUALS

- A. Provide manuals for:
 1. Electrically operated items.
 2. Electrical equipment and controls.
 3. Maintenance manuals provided as part of Submittals.

- B. Submit two sets prior to final inspection, bound in 8-1/2" by 11" three-ring binders with durable plastic covers, clearly identified regarding extent of contents.
- C. Provide a separate volume for each system, with a table of contents and index tabs for each volume.
- D. Arrange by Specification division and gives names, addresses, and telephone numbers of Subcontractors and suppliers. List:
 - 1. Appropriate design criteria.
 - 2. List of equipment and parts lists.
 - 3. Operating and maintenance instructions.
 - 4. Shop drawings and product data.
- E. Electronic Format: Where available in electronic format, submit two USB 3.0 flash drives with information required for operation and maintenance manuals.

END OF SECTION

SECTION 01 78 00

WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Warranties: Compile required, and incidental warranties required by Contract Documents.
 - 1. Manufacturer Warranties: Provide manufacturer's standard warranties where specified including inspections and services included or required as part of manufacturer's standard warranty.
 - 2. Special Warranties: Provide special warranties as required by Specifications sections.
 - 3. These warranties shall be in addition to and not a limitation of other rights Owner may have against Contractor under Contract Documents and which may be prescribed by law, regardless of wording of warranty.
- B. Extended Correction Period: Contractor shall correct failure of materials and systems to perform in a manner consistent with their intended use including but not limited to failure of waterproofing and roofing systems to resist penetration from water.
 - 1. Standard Correction Period: One year after Substantial Completion or Beneficial Occupancy by Owner except where otherwise noted in Contract Documents; coordinate with General Conditions and Supplementary Conditions.
 - a. Items used by Contractor during construction operations shall not be considered substantially completed.
 - b. Correction of Work Period begins with Owner occupancy not completion of component.
 - 2. Extended Correction Period: Requirements are same as standard correction period but for an extended period as indicated in Specifications sections.
 - 3. Contractor Responsibilities: Bear cost of correcting failed work and replacing construction damaged by failure of materials and systems to perform in a manner consistent with their intended use during correction period.
 - a. Requirements for correction period shall apply to Subcontractors, suppliers, installers, and those responsible for failed work.
 - b. Owner and Design Team shall not be responsible for determining degree of responsibility of those involved.

4. Owner's Rights under Law: Correction period shall be in addition to and not a limitation of other rights Owner may have against Contractor under Contract Documents and which may be prescribed by law.

1.2 FORM OF SUBMITTAL

- A. Special Warranty and Extended Correction Period Forms: Provide duplicate copies, notarized or on Contractor and Manufacturer's letterhead without conditions or exceptions to requirements specified.
 1. Assemble documents executed by subcontractors, installers, suppliers, and manufacturers.
 2. Provide table of contents and assemble in binder with durable plastic cover, clearly identified regarding extent of contents.
 3. Electronic Format: Submit USB 3.0 flash drives of warranties, in Microsoft Word.
- B. Manufacturer Warranty Forms: Use manufacturer's standard forms unless otherwise directed in Contract Documents; completed form shall not detract from or confuse interpretations of Contract Documents.
 1. Manufacturer's authorized representative shall sign manufacturer warranties.
 2. Subcontractor and installer shall countersign warranty where specified.
 - a. Provide required warranties for waterproofing and roofing systems countersigned by subcontractor and installer.
- C. Submit final warranties prior to final application for payment.
 1. For equipment put into use with Owner's permission during construction, submit within ten days after first operation.
 2. For items of Work delayed materially beyond Date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.
- D. Provide information for Owner's personnel regarding proper procedure in case of failure and instances that might affect validity of manufacturer warranty.
- E. Size: 8-1/2" by 11" for three-ring binder; fold larger sheets to fit.

1.3 WARRANTIES AND CORRECTION OF WORK DOCUMENTS

- A. Warranties and Correction of Work Documents are intended to protect Owner against failure of work and against deficient, defective and faulty materials and workmanship, regardless of sources.
- B. Limitations: Warranties and correction of work requirements are not intended to cover failures that result from:

1. Unusual or abnormal phenomena of the elements.
 2. Owner's misuse, maltreatment or improper maintenance of work.
 3. Vandalism after substantial completion.
 4. Insurrection or acts of aggression including war.
- C. Related Damages and Losses: Remove and replace work which is damaged as result of failure, or which must be removed and replaced to provide access for correction of work.
- D. Reinstatement: After correction of work reinstate warranty or extended correction period for corrected work to date of original expiration, but not less than half original period.
1. Correction of Work Period: The general correction of work period specified shall not be extended by corrective work except to extent required to correct failure and repair or replace materials damaged by failure.
- E. Replacement Cost: Replace or restore failing items without regard to anticipated useful service lives where part of correction of work period, extended correction of work period, and special warranty period unless otherwise noted.
- F. Rejection of Warranties: Owner reserves right to reject unsolicited and coincidental product warranties that detract from or confuse interpretations of Contract Documents.

END OF SECTION

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide equipment and systems demonstration and instruction in accordance with Contract Documents.
 - 1. Video record seminars and system demonstrations.
- B. Related Sections:
 - 1. Section 01 31 00: Project management and coordination.
 - 2. Section 01 77 00: Contract closeout procedures.
 - 3. Refer to Facility Services Subgroups for mechanical and electrical requirements.

1.2 DESCRIPTION

- A. Seminar Agenda and Outline:
 - 1. Prepare a seminar agenda and outline in consultation and cooperation with Owner. Include following:
 - a. Equipment and systems that will be included in seminars.
 - b. Name of companies and representatives presenting at seminars.
 - c. Outline of each seminar's content.
 - d. Time and date allocated to each system and item of equipment.
 - 2. Submit preliminary seminar agenda and outline for review and comment by Owner.
 - a. Revise and resubmit agenda and outline until all seminar requirements have been satisfied and seminar dates and presenters have been finalized.
 - 3. Submit final seminar agenda and outline no later than eight weeks before date of Acceptance of Work.
- B. Seminar Organization:
 - 1. Contractor's presentation leaders shall chair seminars.
 - a. Coordinate qualification of training personnel, seminar contents, and presentations with Owner.
 - 2. Coordinate individual presentations and ensure manufacturer's representatives scheduled to be at training seminars are present.

3. Arrange for presentation leaders familiar with design operation, maintenance and troubleshooting of equipment and systems.
 - a. Where one person is not familiar with all aspects of equipment or system; arrange for specialists familiar with each aspect.
 4. Coordinate proposed seminar dates with Owner and select mutually agreeable dates.
 5. Video Recording: Arrange for video recording (audio and video) of training seminars and system demonstrations, including seminar and demonstration questions and answers.
- C. Seminar Content:
1. Architect's Consultants will explain design philosophy of primary systems.
 2. Include following information in presentations dealing with specific systems.
 - a. An overview of how system is intended to operate.
 - b. Describe design parameters, constraints and operational requirements.
 - c. Describe system operation strategies.
 - d. Provide information to help in identifying and troubleshooting problems.
 3. Include following information in presentations dealing with equipment.
 - a. Explanation of how equipment operates.
 - b. Recommended preventative and routine maintenance.
- D. System Demonstration:
1. Demonstrate operation of equipment and systems when specified in individual technical sections. Include following in demonstration.
 - a. Start-up and shut down.
 - c. Operation.
 - d. Scheduled and preventative maintenance.
 - e. Troubleshooting.
 2. Demonstration may be conducted at time of original starting with Owner's prior approval.
- E. Seminar and Demonstration Questions:
1. Be prepared to answer questions raised by Owner's personnel at demonstrations and seminars.
 2. If unable to satisfactorily answer questions immediately, provide written response within three days.
- F. Use manufacturer's operation and maintenance data as basis of instruction.

1.3 SUBMITTALS

- A. Video Recording: Submit three copies of each video recording in DVD format acceptable to Owner; include label on each DVD and on each container identifying Project and Seminar content.

END OF SECTION

SECTION 02 41 10

STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Demolish existing construction as required for Project.
 - 1. Remove site structures including fence walls, trellis, gates, flatwork, landscaping, as indicated.
 - 2. Carefully remove, protect and deliver to owner items identified. Includes time capsule, dedication plaques, etc. Confirm with owner at pre-demolition walk through.
 - 3. Remove foundations including floor slabs.
 - 4. Cap and identify active utilities.
- B. Related Sections:
 - 1. Section 01 10 00: Summary of work including hazardous materials requirements.
 - 2. Section 01 50 00: Temporary facilities including barriers and waste management.
 - 3. Section 01 74 10: Waste management.
 - 4. Municipal Authorities: Dismantling, removing, and capping of Municipal utilities.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Do not interfere with use of adjacent buildings; maintain free and safe passage to and from.
 - 2. Prevent movement or settlement of adjacent structures, provide and place bracing or shoring and be responsible for safety and support of structures. Assume liability for movement, settlement, damage or injury.
 - 3. Cease operations and notify Architect immediately if safety of adjacent structures appears to be endangered; take precautions to properly support structures. Do not resume operations until safety is restored.
 - 4. Prevent movement, settlement or collapse of adjacent services, sidewalks, driveways and trees. Assume liability for such movement, settlement or collapse, promptly repair.
 - 5. Obtain permission from adjacent property owners when outriggers, swinging cranes or similar equipment traverse their property.
- B. Design/Build: Provide special engineering to ensure compliance with applicable codes and Contract Documents for shoring.

- C. Scheduling: Do not close or obstruct roadways without permits. Conduct operations with minimum interference to adjacent traffic.

1.3 SUBMITTALS

A. Action Submittals:

- 1. Submit demolition procedures and operational sequence to ensure Project sequencing is consistent with Owner needs.

B. Informational Submittal:

- 1. Submit copies of permits and notices authorizing demolition work.
- 2. Submit copies of certificates of severance of utility services.
- 3. Submit copies of permit for transport and disposal of debris.

- C. Pre-Demolition Photographs: Show conditions of exiting adjacent construction and site improvements that might be misconstrued as damaged by demolition operations. Submit before work begins.

- D. Design/Build Certificates: Submit certification signed by California licensed structural engineer indicating shoring compliance with code requirements.

1.4 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with *CALGreen* requirements including those relative to pollution control for construction waste.

1.5 SITE CONDITIONS

- A. Structures to be demolished shall be evacuated and their use discontinued before start of work.
- B. Arrange and pay for disconnecting or removing, capping and plugging utility services; disconnect and stub off; notify affected utility company in advance and obtain approval before starting Work.
- C. Place markers to indicate location of disconnected services; identify service lines and capping locations on Project Record Documents.
- D. Maintain access to existing walkways, exits, and adjacent occupied facilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Debris: Maintain possession of materials being demolished except where noted as a material for reinstallation or a material to be retained by Owner. Immediately remove debris from site.

- B. Materials for Reinstallation: Carefully remove, store and protect materials indicated to be reinstalled. Contact Owner and Architect prior to beginning demolition to determine extent of other materials that might be suitable for reinstallation.
 - 1. Inventory and record condition of items to be reinstalled.
- C. Owner Retained Materials: Contact Owner prior to beginning demolition to determine extent of materials to be retained. Carefully remove materials indicated to be retained by Owner; deliver and store where directed.
 - 1. Inventory and record condition of items to be retained by Owner.

PART 3 - EXECUTION

3.1 DEMOLITION

- A. Demolish structures and appurtenances in an orderly and careful manner.
 - 1. Tanks: Remove tanks within construction area; pump out buried tanks located outside construction area, fill tanks with sand or fine gravel and cover with fill unless otherwise indicated.
- B. Perform demolition in accordance with authorities having jurisdiction.
 - 1. Do not use explosives.
- C. Keep work sprinkled to prevent dust; provide hoses and water as required for demolition. Coordinate potential availability of water from existing on-site water sources with Owner; do not use on-site water without prior written approval.
- D. Remove demolished materials from site, unless otherwise directed.
 - 1. Burning of materials on site is not permitted.
 - 2. Remove from site, contaminated, vermin infested, or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers or public.
- E. Rough grade areas affected by demolition and leave level to within one percent; maintain grades and contours of site as indicated.
 - 1. Backfill over excavated areas, open pits and holes caused as a result of demolition which exceed excavation limits for project; use approved fill.
- F. Remove demolished materials, tools and equipment upon completion of work; leave site in condition acceptable to Architect.

3.2 REPAIR

- A. Repair damage to adjacent structures caused as result of demolition.
- B. Repair demolition beyond that required for Project.

OC FAIR AND EVENT CENTER
CAMPGROUND –
SHOWER & RESTROOM BUILDING

7/15/25

DSA SUBMITTAL

END OF SECTION

SECTION 02 41 20

SELECTIVE BUILDING DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Selectively remove materials, systems, components, fixtures and equipment as designated and as required for completion of Project as indicated.
 - 1. Cap and identify active utilities.
 - 2. Prepare existing library for remodel. Coordinate phasing with owner to maintain operations of library throughout construction of expansion. Prepare phasing plan that limits the absolute minimum, shut downs and closures of the existing library. Maintain a clean and safe environment during work. Maintain egress during construction of the expansion via temporary protected walkways.
 - 3. Identify pathways through existing building for electrical, fire alarm, and low voltage conduits, etc. Prepare openings as required to access the work and make repairs to existing finishes to match adjacent finish.
 - 4. Prepare and submit a site/building logistics, phasing, and safety plan for owner and architect review prior to commencing work.
- B. Related Sections:
 - 1. Section 01 10 00: Summary of work including hazardous materials requirements.
 - 2. Section 01 50 00: Temporary facilities including barriers and waste management.
 - 3. Section 01 73 00: Cutting and patching.
 - 4. Section 02 41 10: Structure demolition.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Do not interfere with use of adjacent building spaces not in Project; maintain free and safe passage to and from.
 - 2. Prevent movement of structural components, provide and place bracing and be responsible for safety and support of structural components. Assume liability for movement, settlement, damage or injury.
 - 3. Cease operations and notify Architect immediately if safety of structural components appears to be endangered; take precautions to properly support structures. Do not resume operations until safety is restored.

- 4. Prevent dust from selective demolition from contaminating adjacent occupied building areas; clean construction dust from adjacent occupied area immediately upon direction of Building Manager.
- B. Design/Build: Provide special engineering to ensure compliance with applicable codes and Contract Documents for support systems.
- C. Scheduling: Do not close or obstruct roadways without permits. Conduct operations with minimum interference to adjacent traffic.

1.3 SUBMITTALS

- A. Action Submittals: Submit selective demolition operational sequence to ensure Project sequencing is consistent with Owner needs.
 - 1. Prepare and submit a site/building logistics, phasing, and safety plan for owner and architect review prior to commencing work.
- B. Informational Submittals: Submit permits for transport and disposal of debris.

1.4 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with *CALGreen* requirements including those relative to finish material pollution control and for construction waste.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Debris: Maintain possession of materials being demolished except where noted as a material for reinstallation or a material to be retained by Owner. Immediately remove debris from site.
 - 1. Immediately remove from site wet materials and materials with water stains, with mold, and with mildew.
- B. Materials for Reinstallation: Carefully remove, store and protect materials indicated to be reinstalled. Contact Owner and Architect prior to beginning demolition to determine extent of other materials that might be suitable for reinstallation.
 - 1. Inventory and record condition of items to be reinstalled.
- C. Owner Retained Materials: Contact Owner prior to beginning demolition to determine extent of materials to be retained. Carefully remove materials indicated to be retained by Owner; deliver and store where directed.
 - 1. Inventory and record condition of items to be retained by Owner.

PART 3 - EXECUTION

3.1 EXISTING SERVICES

- A. Disconnect or remove utility services as required for completion of Project; disconnect, stub off, and cap utility service lines not required for new construction.
 - 1. Do not remove utilities discovered during demolition but not indicated without first determining purpose for utility; coordinate with Architect and Engineers.
- B. Do not disrupt services to adjacent building areas not in Project.
- C. Place markers to indicate location of disconnected services; identify service lines and capping locations on Project Record Documents.

3.2 DEMOLITION

- A. Demolish indicated appurtenances as indicated and as required for Project completion in an orderly and careful manner.
 - 1. Use methods that do not damage materials indicated to remain.
 - 2. Cut concrete and masonry using masonry saws and hand tools; provide sharp clean cuts requiring minimal patching for new construction.
 - 3. Use impact tools only where specifically approved in advance for areas where operations do not disturb building occupancy.
- B. Perform demolition in accordance with authorities having jurisdiction.
- C. Remove demolished materials from site, unless otherwise directed.
 - 1. Remove from site, contaminated, vermin infested, and dangerous materials encountered and dispose of by safe means so as not to endanger health of workers or public.
- D. Remove tools and equipment upon completion of work; leave area in condition acceptable to Owner and Architect.

3.3 REPAIR

- A. Repair damage to adjacent construction caused as result of this work.
- B. Repair demolition beyond that required.

END OF SECTION

SECTION 03 35 15

SEALED CONCRETE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide applied curing, hardener, sealer type curing compound to concrete flooring including preparation of concrete as required for complete installation.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene not less than one week prior to commencing concrete placement, including applying hardener sealer, at areas indicated to have a hardener sealed finish.
 - 1. Require attendance of those directly affecting work of this Section.
 - 2. Review concrete installation and coordinate required preparation.

1.3 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature for each type of material involved in curing, hardener, sealer for concrete.
- B. Samples: Furnish sample panels of concrete with curing, hardener, sealer applied to half of surface; indicate which half has hardener sealer.
- C. Maintenance Instructions: Provide written instructions for recommended periodic maintenance.

1.4 QUALITY ASSURANCE

- A. Curing, Hardener, Sealer Installers: Firms with not less than five years successful experience applying specified curing, hardener, sealer and acceptable to system manufacturer.
- B. Mock-Up: Erect minimum 10 square feet of concrete flooring with curing, hardener, sealer at location as approved. Approved mock-up may be incorporated into Project.

PART 2 - PRODUCTS

2.1 SYSTEM MANUFACTURERS

- A. Nox-Crete Products Group (800.669.2738).
- B. W.R. Meadows, Inc. (800.342.5976).
- C. PROSOCO, Inc. (800.255.4255).

- D. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide applied curing, hardener, sealer to concrete flooring.
- B. Regulatory Requirements, VOC Emissions: Comply with applicable limitations for volatile organic compound (VOC) emissions for concrete sealing materials.
- C. Accessibility Regulatory Requirements: Provide for assuring access for persons with disabilities in accordance with state and federal regulations for slip resistance.
 - 1. California Regulations: Comply with California Building Standards Code.
 - 2. Federal Regulations: Comply with Americans with Disabilities Act (ADA) Standards.
 - 3. Slip-Resistant Hard Surfaces: Hard surface finishes to comply with requirements of authorities having jurisdiction for slip-resistant hard surfaces, including general code requirements and requirements for access for persons with disabilities.
- D. Hardener, Sealer, Densifier: Provide water borne penetrating lithium silicate system designated by system manufacturer as hardener, sealer, densifier.
 - 1. Basis of Design: Nox-Crete Products Group/Duro-Nox LS.
 - 2. Basis of Design: W. R. Meadows, Inc./Liqui-Hard Ultra.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Ensure surfaces to receive hardener sealer are clean and well cured.
- B. Do not commence work until surface conditions are within tolerances required for proper finishing based on manufacturer recommendations.
- C. Start of work indicates acceptance of conditions.

3.2 PREPARATION

- A. Clean concrete slab free from foreign matter and prepare concrete for sealing in accordance with system manufacturer recommendations.

3.3 INSTALLATION

- A. Comply with curing, hardener, sealer manufacturer recommendations and application instructions for application of concrete hardener sealer densifier as required to match approved samples and mock-up.

3.4 PROTECTION

- A. Comply with system manufacturer recommendations for protecting floors until ready for use. Keep surface dry for minimum 48 hours after application.

- B. Do not permit traffic on floors with curing, hardener, sealer for at least 72 hours.
- C. Protect floors with curing, hardener, sealer until Substantial Completion.

END OF SECTION

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide concrete masonry unit construction, with mortar, reinforcement, anchorage, and accessories as required for complete installation.
 - 1. Cut and fit concrete masonry for work of other trades.
- B. Work Installed But Not Furnished: Build in items supplied by other trades and suppliers.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene not less than one week prior to commencing work of this section. Require attendance of parties directly affecting work of this section.
 - 1. Review installation procedures and coordination required with related work.

1.3 SUBMITTALS

- A. Product Data: Furnish manufacturer's certificate concrete masonry units conform to specified standards.
- B. Shop Drawings: Furnish drawings for reinforcing; show bar schedules, diagrams of bent bars, ties and arrangements and assemblies.
- C. Samples: Furnish section of exposed concrete masonry face indicating texture and color along with each type of colored mortar.

1.4 QUALITY ASSURANCE

- A. Mock-Up: Provide minimum 4'-0" by 2'-8" sample panel of concrete masonry construction, clearly indicating joints and methods of reinforcing. Erect mock-up at Project Site, in location as approved by Architect.
 - 1. Approved mock-up may be incorporated into Project.

1.5 SITE CONDITIONS

- A. Temperature: Maintain materials to minimum 50 degrees F prior to, during and 48 hours after completion of masonry work.
 - 1. Do not place masonry units when air temperature is below 40 degrees F.

2. During colder weather, work may continue where equipment is used to maintain constant temperature above 40 degrees F and masonry work completed and in progress is kept covered.
 3. Protect masonry construction from direct wind and sun exposure when temperatures exceed 99 degrees F and relative humidity is less than 50 percent.
- B. Bracing: Provide temporary bracing during erection of masonry work, maintain in place until building structure provides permanent bracing.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description Includes: Provide concrete masonry unit construction, with mortar, reinforcement, anchorage, and accessories as required for complete installation.
- B. Regulatory Requirements: Perform concrete unit masonry work in accordance with requirements of California Building Standards Code except where more restrictive requirements are specified.
- C. Concrete Masonry Units: Hollow loadbearing units conforming to ASTM C90.
1. Concrete Masonry Manufacturers:
 - a. Angelus Block, Co., Inc.
 - b. Orco Block Co., Inc.
 - c. RCP Block and Brick, Inc.
 - d. Substitutions: Refer to Section 01 25 00.
 2. Weight: Provide medium weight units
 - a. Medium Weight, 105 to 125 pcf.
 3. Compressive Strength: Comply with ASTM C90, with minimum 1900 psi per unit when tested in accordance with ASTM C140.
 4. Size: Nominal 8" by 16" face measurement with thickness as indicated on Drawings.
 5. Exposed Face Surfaces: Dense with uniform texture and color throughout Project.
 6. Exposed Face Surfaces: Dense with finish as approved by Architect prior to manufacturing; uniform texture and color throughout Project.
 - a. Texture: Split face as indicated on Drawings.
 - b. Colors: Where integral color is not indicated on Drawings or Finish Schedule, provide custom integral color as directed by Architect.

7. Special Shapes: Provide proper specially shaped units for bond beams, lintels, corners and jambs.
 - a. Exposed Special Shapes: Design bond beams, lintels, corners and jambs and fillers to match and complement block units; where required perform cutting with masonry saw.
- D. Mortar: Conform to ASTM C270, Type S.
 1. Masonry Cement/Premix Mortar: Acceptable only if manufacturer certifies product is made of cement and lime, with no limestone or pulverized material used in lieu of hydrated lime.
- E. Grout: Conform to ASTM C476; minimum compressive strength 2,000 psi.
- F. Mortar and Grout Materials:
 1. Portland Cement: ASTM C150, Type I.
 2. Hydrated Lime: ASTM C207, Type S.
 3. Use ANSI A118.15 polymer-modified mortars: Mapei or equal
 4. Aggregates: Standard masonry mortar and grout type; clean, dry and protected against dampness, freezing and foreign matter.
 - a. Mortar Aggregates: Conform to ASTM C144.
 - b. Grout Aggregates: Conform to ASTM C404.
 5. Water: Clean, drinkable, free of injurious amounts of oil, alkali, organic matter or other harmful materials.
 6. Exposed Mortar Colors: Integral color as indicated, as directed by Architect where not otherwise indicated.
- G. Reinforcement and Anchorages: Provide reinforcing and anchorages as indicated on Drawings.
 1. Deformed Bars: ASTM A615, Grade 60 for bars No. 3 and larger, unless otherwise indicated.
 2. Plain Bars: ASTM A675, Grade 80 for No. 2 bars, unless otherwise indicated.
 3. Joint Reinforcement: ASTM A82, free from mill scale and excess or loose rust deposits.
- H. Control Joints: Closed cell neoprene or PVC factory fabricated solid sections, resistant to oils and solvents, flexible at temperatures from 40-degree F after five hours exposure; ASTM D2240 minimum durometer 70.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Supply metal anchors required for concrete masonry to appropriate trades for placement; provide in quantities required for Project and direct placement.
 - 1. Ensure items built in by other trades are properly located and sized.
- B. Establish lines, levels and coursing, protect from disturbance.
- C. Clean surfaces to receive masonry free from dirt, debris, and laitance.

3.2 INSTALLATION

- A. Do not wet concrete masonry units; lay units in mortar with full bed and head joints, properly jointed with other work.
 - 1. Fully bond corners and intersections.
 - 2. Align cells of units to maintain clear, unobstructed space for reinforcing and grout, keep cells free of mortar and debris.
- B. Do not shift or tap masonry units after mortar has taken initial set, where adjustment must be made, remove mortar and replace.
- C. Buttering corners of joints and deep or excessive furrowing of mortar joints is not acceptable.
- D. Perform job site cutting with proper power tools to provide straight, true, unchipped edges.
- E. Provide structural anchorage or retention in accordance with applicable code requirements.
- F. Ensure masonry courses are of uniform height, make vertical and horizontal joints equal and of uniform thickness.
 - 1. Lay concrete unit masonry in running bond.
 - 2. Course one block unit and one mortar joint to equal 8".
- G. Remove excess mortar and projections, take care to prevent breaking block corners.
- H. Bonded **Masonry Veneer**: Install masonry veneer in accordance with bonding material manufacturer's instructions, ANSI A108.5, and recommendations of Tile Council of North America (TCNA).
 - 1. Use ANSI A118.15 polymer-modified mortars: Mapei or equal

2. Place in accordance with patterns as indicated on Drawings or as directed; carefully plan masonry veneer layouts; ensure pattern is uninterrupted from one surface to next.
3. Neatly cut masonry veneer where required; accurately form corners, intersections and returns.
4. Adhered masonry units to be 100% back buttered prior to application to wall.
5. Ensure joints are uniform in width, subject to normal variance in tolerance allowed in veneer size; ensure joints are watertight, without voids, cracks or excess mortar.
 - a. Form mortar in joints to smooth concave shape; avoid getting latex mortar on face of masonry veneer.
6. Completed installation shall be free of broken, damaged and faulty veneer.
- I. Grout Joints: Mechanically grout joints as required to match approved samples and mock-up; joints are required to be grouted and tooled to rodded mortar joint.
- J. Complete mechanical grouting, tooling, and cleaning immediately after installation of adhered masonry veneer
- K. Tolerances:
 1. Maximum allowable variation from masonry unit to adjacent masonry unit is 1/32" where masonry units are exposed in finished construction and where waterproofing is applied over masonry units.
 2. Maximum allowable variation from plane of wall is 1/4" in 10 feet, and maximum 1/2" in 20 feet or more.
 3. Maximum allowable variation from plumb is 1/4" per story, non-cumulative, and maximum 1/2" in two or more stories.
 4. Maximum allowable variation of level coursing is 1/8" in 3 feet, 1/4" in 10 feet and 1/2" in 30 feet.
- L. Mortar Joints: Compress joints with a round or curved metal tool.
 1. Compress mortar joints with jointing tool with minimum diameter three times width of mortar joint, to provide a flush surface where resilient base or waterproofing is to be applied over masonry.
- M. Reinforcement and Anchorage: Fully reinforce corners and intersections. Lap splices minimum 6". Extend splices minimum 16" each side of openings.
 1. Support and secure reinforcing bars to maintain within 1/2" of dimensioned position.
 2. Retain vertical reinforcement in position at top and bottom of cells and at intervals not to exceed 192 bar diameters.

- N. Lintels: Provide reinforced concrete masonry unit lintels over openings where steel lintels are not scheduled.
 - 1. Use full length reinforcing bars.
- O. Grouting: Place grout when concrete masonry units are surface dry; consolidate and reconsolidate by mechanical vibration.
 - 1. Fine Grout: Use for spaces less than 2" in width using low lift grouting techniques.
 - 2. Coarse Grout: Use for spaces 2" or more in width.
 - 3. When grouting is stopped for more than one hour, terminate grout approximately 2" below top of upper masonry unit to form positive key for subsequent grout placement.
 - 4. Low-Lift Grouting: Place first lift of grout at 16" and place subsequent lifts at 8" increments.
 - 5. Hi-Lift Grouting: Use only where specifically approved by Architect and only where grout spaces are 3" or greater in width.
 - a. Provide minimum 4" high cleanouts at bottom of each cell to be grouted, clean out cells and inspect prior to grouting.
 - b. Pump grout into cells with maximum 48" lifts.
- P. Built-In Work: As work progresses, build in frames, lintels, nailing strips, anchor bolts, plates, and other items supplied by other trades.
 - 1. Build in items plumb and true.
 - 2. Do not build in organic materials which will be subject to rot or deterioration.
 - 3. Bed anchors of frames in mortar joints; fill frame voids solid with mortar; fill masonry cores with grout minimum 12" from framed openings.
- Q. Cutting and Fitting: Cut and fit for chases, pipes, conduit, sleeves, and grounds; coordinate with work of other Specification sections to ensure correct size, shape and location.

3.3 CLEANING

- A. Remove excess mortar and smears upon completion of masonry work.
- B. Point or replace defective mortar, match adjacent work.
- C. Clean soiled surfaces using a non-acidic solution which will not harm masonry or adjacent materials, consult masonry manufacturer for acceptable cleaners.
- D. Use non-metallic tools in cleaning operations.

3.4 PROTECTION

- A. Maintain protective boards at exposed external corners which may be damaged by construction activities; protect without damaging completed work.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide stock and custom fabricated metal items scheduled at end of this Section, complete in respect to function as intended.
 - 1. Metal fabrications includes items made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not a part of structural steel or metal systems specified elsewhere.
- B. Related Sections:
 - 1. Section 32 31 20: Decorative metal fences and gates.

1.2 REFERENCES

- A. American Welding Society (AWS): D1.1, Structural Welding Code.
- B. National Association of Architectural Metal Manufacturers (NAAMM): Pipe Rail Manual.
- C. National Association of Architectural Metal Manufacturers (NAAMM):
 - 1. Pipe Rail Manual.
 - 2. Heavy Duty Metal Bar Grating Manual.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's literature for products used in metal fabrications, including paint, grout and manufactured items.
- B. Shop Drawings: Submit for fabrication and erection of metal fabrications. Indicate profiles, sizes, connection, reinforcing and anchorage.
 - 1. Provide templates for anchorage installation by others.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide stock and custom fabricated metal items.
- B. Steel Shapes, Plates and Bars: ASTM A36.
 - 1. Steel Bar Grating: ASTM A36 or ASTM A1011.

2. Wrought Iron: Maximum 0.3% carbon content with slag mechanically mixed with iron and conforming to ASTM E350 analysis; soft, ductile, and corrosion resistant.
- C. Structural Steel Sheet: Hot rolled, ASTM A1011; or cold rolled, ASTM A1008, Class 1; of grade required for design loading.
- D. Steel Pipe: ASTM A53, Type S seamless, grade as selected by fabricator and as required for design loading; minimum standard weight, STD or Schedule 40.
- E. Steel Tubing: Cold formed ASTM A500; or hot rolled, ASTM A501; minimum Grade B; seamless where exposed.
- F. Castings: Gray iron, ASTM A48, Class 30; malleable iron, ASTM A47.
- G. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron ASTM A47, or cast steel ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- H. Grout: Non-shrink meeting ASTM C1107, non-metallic, pre-mixed, factory-packaged, non-staining, non-corrosive; type specifically recommended by manufacturer as applicable to job condition.
- I. Fasteners and Rough Hardware: Type required for specific usage; provide zinc-coated fasteners for exterior use or where built into exterior walls.
- J. Welding Materials: AWS D1.1, type required for materials being welded.
- K. Paint: Provide primers as recommended by paint manufacturers for substrates and paints specified in Section 09 90 00 – Painting and Coating.
 1. Galvanizing Repair Paint: High zinc-dust content paint for regalvanizing welds in galvanized steel.

2.2 FABRICATION

- A. Fabricate items with joints neatly fitted and properly secured.
- B. Grind exposed welds continuous, smooth and flush with adjacent finished surfaces, and ease exposed edges to approximate 1/32" uniform radius.
- C. Exposed Mechanical Fastenings: Flush countersunk fasteners unobtrusively located, consistent with design of structure.
- D. Fit and shop assemble in largest practical sections for delivery.
- E. Make exposed joints flush butt type, hairline joints where mechanically fastened.
 1. Fabricate joints exposed to weather in manner to exclude water or provide weep holes where water could accumulate.
- F. Supply components required for proper anchorage of metal fabrications; fabricate anchorage and related components of same material and finish as metal fabrication.

- G. Railings: Comply with California and ADA Standards access requirements and NAAMM "Pipe Railing Manual"; welded construction; cap exposed ends.
 - 1. Railing Design Requirements: Design railings to support a lateral force of 50 lbs. /lin. ft. uniform load and 200 lbs. at any single point without permanent set or damage; ASTM E935.
 - a. Top Rails: Design to support minimum 300 lb. concentrated single point load applied at any point vertically or horizontally.
 - 2. Regulatory Requirements:
 - a. Access: Comply with California Building Standards Code and Americans with Disabilities Act (ADA) Standards for access for persons with disabilities.
 - b. Code: Comply with requirements of applicable codes for railing design, except where more restrictive codes are specified.
 - 3. Handrails: Seamless steel tube rails, 1-1/2" outside diameter, continuous railings conforming to applicable code and design requirements.
 - 4. Wall Rail Brackets: Castings as approved by Architect.
 - 5. Wall Returns: 90° elbow return with 1/4" maximum clearance unless otherwise indicated.
 - a. Provide wall plates only where indicated and where required by applicable codes.
- H. Ladders: Comply with requirements of ANSI A14.3 and Cal/OSHA; Contractor option steel or aluminum.
 - 1. Rungs: Fit in centerline of side rails, plug weld and grind smooth on outer rail faces; provide non-slip surface on top of rung, similar to epoxy resin and aluminum oxide granules surface.
 - 2. Ladder Extensions: Provide 48" ladder extension device for fixed ladders under access hatches and floor doors.
 - a. Manufacturers:
 - 1) Bilco/LadderUP Safety Post.
 - 2) O'Keeffe's/Safety Post Model SP400.
 - 3) Precision Ladder/Extend-A-Rail.
 - 4) Substitutions: Refer to Section 01 25 00.
 - 3. Personal Fall Arrest Systems: Provide system on ladder designed to stop a fall before person contacts a lower level where required for specific ladder applications; system to be acceptable to authorities having jurisdiction.

4. Ladder Security Doors: Nominal 18 gage (0.05") thick metal plate with piano hinge and hasp and staple for Owner furnished padlock; not less than full ladder width, between vertical rails, and 8'-0" high.
- I. Steel Bollards: Minimum Schedule 80 seamless steel piping, filled with minimum 2000 psi concrete.
 1. Removable Bollards: As indicated; provide steel piping without concrete fill, fitted with hasp and eye to allow for Owner furnished padlocks to prevent unauthorized removal; cap top end of pipe with flush, welded end cap; bottom open.
- J. Fall Protection Roof Eye Bolts: Provide roof tie backs conforming to Title 8, California Code of Regulations, Section 3191(f) for tie-backs for fall protection where applicable.
 1. Type: 2" closed eye drop forged hot-dipped galvanized eye bolts, 12'-0" on center.
 2. Strength: Set to withstand minimum 5400 lb. tensile load.
 - a. .
- K. Finishes: Galvanize and prime paint exterior work and prime paint interior work unless otherwise noted in Schedule; comply with requirements of Section 09 90 00 - Painting and Coating for preparation and priming.
 1. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to applying finish.
 2. Do not shop prime surfaces in contact with concrete or requiring field welding; shop prime in one coat.
 3. Galvanized Coating: Provide coating comparable to ASTM A924 and A653, minimum G90 hot dip galvanized coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible; do not delay job progress; allow for trimming and fitting where necessary.

3.2 ERECTION

- A. Obtain Architect's review prior to site cutting and adjusting which are not part of scheduled work.
 1. Perform necessary cutting and altering for installation and coordination with other work.

- B. Install items square and level, accurately fitted and free from distortion or defects detrimental to appearance or performance.
 - 1. Supply items required to be cast into or embedded in other materials to appropriate trades.
 - 2. Ensure alignment with adjacent construction; coordinate with related work to ensure no interruption in installation.
- C. Make provision for erection stresses by temporary bracing; keep work in alignment.
- D. Field bolt and weld to match standard of shop bolting and welding; hide bolts and screws whenever possible, where not hidden, use flush countersunk fastenings.
 - 1. Perform field welding in accordance with AWS D1.1.
- E. After installation, touch-up field welds and scratched and damaged surfaces; use primer consistent with shop coat or recommended for galvanized surfaces, as applicable.
- F. Replace items damaged in course of installation and construction.

3.3 SCHEDULE

- A. Supply and install metal fabrications listed in Schedule, complete with anchorage and attachments necessary for installation.
 - 1. Schedule lists principal items only, refer to Drawings for items not listed.
- B. Schedule:
 - 1. Miscellaneous angles, plates and attachments to be set in concrete or masonry for anchorage of other items.
 - 2. Iron and steel shapes, sleeves, anchors, connectors and fastenings required to complete construction work, and which are not provided in other Specification sections.
 - a. Rough hardware, including bolts, fabricated plates, anchors, hangers, dowels and miscellaneous metals.
 - b. Ledge and shelf angles, channels and plates not attached to structural steel, and for support of metal decking.
 - c. Beams of structural shapes not supported by structural steel.
 - 3. Ladders.
 - 4. Steel bollards.
 - 5. Roof eye bolts.

END OF SECTION

SECTION 05 70 00

DECORATIVE METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide decorative (ornamental) metal items including attachment
 - 1. Provide custom aluminum canopies.
- B. Related Work:
 - 1. Section 05 50 00: Metal fabrications including steel railings.
 - 2. Section 32 31 20: Decorative metal fences and gates.

1.2 REFERENCES

- A. National Association of Architectural Metal Manufacturers: Metal Finishes Manual.
- B. Builders Hardware Manufacturers Association (BHMA): BHMA 1301/ ANSI A156.18 Standard for Materials and Finishes.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Design/Build: Provide special engineering to ensure compliance with applicable codes and Contract Documents.
- B. Pre-Installation Meeting: Convene not less than one week prior to commencing work of this Section. Require attendance of those directly affecting work of this Section.
 - 1. Review installation procedures and coordination required with related work.

1.4 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature including recommendations for cleaning.
- B. Shop Drawings: Show detailing including anchorage, accessories, and supporting members.
- C. Samples: Furnish samples of each exposed metal finish.
- D. Design/Build Certificates: Submit engineer certification by California licensed structural engineer indicating decorative metal complies with Contract Documents and applicable code requirements.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm with minimum five years successful experience fabricating decorative metal items like those required for Project.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide decorative (ornamental) metal items specified including attachment devices and accessories.
- B. Aluminum: Provide alloy and temper recommended by aluminum producer or finisher for type and use and finish indicated; sized for strength and durability consistent with application involved.
 - 1. Materials: Comply with following minimum standards for aluminum.
 - a. Extruded Bar and Shapes: ASTM B221, 6063-T6.
 - b. Extruded Pipe and Tube: ASTM B429, 6063-T6.
 - c. Drawn Seamless Tube: ASTM B483, 6063-T832.
 - d. Plate and Sheet: ASTM B209, 6061-T6.
 - e. Die and Hand Forgings: ASTM B247, 6061-T6.
 - f. Castings: ASTM B26, 356.0-T6.
 - 2. Finish: Comply with following finishes as designated by NAAMM "Metal Finishes Manual" and referenced standards.
 - a. Thermal Setting Organic Coating Finish: AA-C21C42R1x, 1.5 mil organic coating; AAMA 603.8.
 - 1) Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 - b. High Performance Organic Coating Finish: AA-C12C42R1x, prepared, pretreated, and coated with minimum two coat Kynar 500 or Hylar 5000 system; AAMA 2605.
 - 1) Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 - c. High Performance Organic Coating Finish: AA-C12C42R1x, prepared, pretreated, and coated with minimum two-coat system; AAMA 2605.
 - 1) PVDF Manufacturers:
 - a) Arkema Group/Kynar 500.
 - b) Solvay Solexis/Hylar 5000.
 - c) Substitutions: Refer to Section 01 25 00.
 - 2) Paint Manufacturers:
 - a) PPG Industries.
 - b) Valspar Corp.
 - c) Akzo Nobel.
 - d) Substitutions: Refer to Section 01 25 00.

- 3) Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect including metallic colors with mica chips.

C. Decorative Iron and Steel:

1. Steel Shapes, Plates and Bars: ASTM A36.
2. Steel Sheet: Hot rolled, ASTM A1011; or cold rolled, ASTM A1008, Class 1; of grade required for design loading.
3. Steel Pipe: ASTM A53, Type S seamless, grade as selected by fabricator and as required for design loading; minimum standard weight, STD or Schedule 40.
4. Steel Tubing: Cold formed ASTM A500; or hot rolled, ASTM A501; minimum Grade B; seamless where exposed.
5. Castings: Gray iron, ASTM A48, Class 30; malleable iron, ASTM A47.
6. Decorative Steel Paint: Provide primers as recommended by paint manufacturers for substrates and paints specified in Section 09 90 00 – Painting and Coating.
 - a. Galvanizing Repair Paint: High zinc-dust content paint for repair of welds in galvanized steel.
7. Blackened Steel Finish: Provide black oxide finish using passivation process to protect steel from rust by forming magnetite on exposed steel surfaces using traditional caustic process of alkali salt solution at elevated temperatures.
 - a. Clear Coating: Provide premium quality polyurethane or acrylic urethane coating for durable protective coating of blackened steel; prepare steel and apply coating in accordance with coating manufacturer recommendations.
 - b. Final Appearance: As approved by Architect; match Architect's sample.
8. Decorative Steel Shop Finish: Provide TGIC powder coat finish over galvanized coating.
 - a. Manufacturers:
 - 1) Courtaulds Coatings (Interpon)/TGIC Powder Coating.
 - 2) Porter Powder Coatings/TGIC Powder Coating.
 - 3) H.B. Fuller Co./TGIC Powder Coating.
 - 4) Fuller O'Brien/TGIC Powder Coating.
 - 5) Substitutions: Refer to Section 01 25 00.
 - b. Powder Coating System: Provide top line quality commercial grade factory formulated polyester TGIC powder coating materials intended for powder coating application and as required to match approved sample.
 - c. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.

- D. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron ASTM A47, or cast steel ASTM A27.
 - 1. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.
- E. Grout: Non-shrink meeting ASTM C1107, non-metallic, pre-mixed, factory-packaged, non-staining, non-corrosive; type specifically recommended by manufacturer as applicable to job condition.
 - 1. Manufactures:
 - a. Master Builders/Masterflow 713.
 - b. Five Star Products, Inc./Five Star Grout.
 - c. Bostik Construction Products/Upcon Grout.
 - d. Protex Industries, Inc./Propak.
 - e. Substitutions: Refer to Section 01 25 00.
- F. Brackets and Anchors: Unexposed plates, angles and supports may be steel; exposed items to match decorative metal type and finish.
- G. Fasteners: Type required for specific usage; provide concealed fasteners except where specifically approved; where exposed match type and finish of metal being fastened.
 - 1. Concealed Steel Fasteners: Hot-dipped galvanized minimum G90 where built into exterior walls or subject to high humidity.

2.2 FABRICATION

- A. Decorative Steel Field Finishes: Galvanize and prime paint exterior work and prime paint interior work unless otherwise noted in Schedule; comply with requirements of Section 09 90 00 - Painting and Coating for preparation and priming.
 - 1. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to applying finish.
 - 2. Do not shop prime surfaces in contact with concrete or requiring field welding; shop prime in one coat.
 - 3. Galvanized Coating: Provide coating comparable to ASTM A924 and A653, minimum G90 hot dip galvanized coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible; do not delay job progress; allow for trimming and fitting where necessary.

3.2 INSTALLATION

- A. Install decorative metal items in accordance with manufacturer's recommendations, installation instructions, and approved shop drawings.
- B. Install plumb, true and in correct relation to adjacent work, free from distortion or defects detrimental to appearance and performance.
- C. Prior to securing continuous items, adjust to ensure proper matching at butt joints and correct alignment throughout their length.
- D. Tolerances: Accurately align and locate components to column lines and floor levels; adjust work to conform to following tolerances.
 - 1. Plumb: 1/8" in 10'-0"; 1/4" in 40'-0"; non-cumulative.
 - 2. Level: 1/8" in 20'-0"; 1/4" in 40'-0"; non-cumulative.
 - 3. Alignment: Limit offset to 1/16" where surfaces are flush or less than 1/2" out of flush and separated by less than 2" (by reveal or protruding work); otherwise limit offsets to 1/8".
 - 4. Location: 3/8" maximum deviation from measured theoretical location (any member, and location).
- E. Install anchorage devices to securely and rigidly fasten system to building.
- F. Provide anchors to be installed in other work, and setting details, in time for proper installation by trades concerned; verify correct placement.

3.3 CLEANING

- A. Clean decorative metal surfaces promptly after installation of components, exercising care to avoid damage of finish.
- B. Remove excess sealant compounds, dirt and other foreign substances.

3.4 PROTECTION

- A. Repair or replace items damaged or marred during construction.

END OF SECTION

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

1.1 PART 1 - GENERAL

A. WORK INCLUDED

1. Roof curbs and cants.
2. Blocking in wall and roof openings.
3. Wood furring and grounds.
4. Wood treatment.

B. REFERENCES

1. APA - American Plywood Association.
2. AWWPA - American Wood Preservers Association: Treating Practices.
3. RIS - Redwood Inspection Service: Standard Specifications for Grades of California Redwood Lumber.
4. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules for West Coast Lumber.
5. WWPA - Western Wood Products Association.

C. SUBMITTALS

1. Submit certificate based on actual moisture content readings performed in accordance with this Section, indicating moisture content of all lumber was 19 percent or less at time of installation.

D. QUALITY ASSURANCE

1. Lumber Grading Agency: Certified by specified agency and approved by Division of State Architect.
2. Plywood Grading Agency: Certified by specified agency.
3. Provide Certificate of Inspection or grade mark by an approved inspection agency on each piece of lumber and plywood, indicating compliance with applicable standards or grading rules specified in the referenced standards and this Section.
4. Provide quality mark by an approved inspection agency on each piece of preservative- treated lumber and plywood, indicating compliance with applicable standards or grading rules specified in the referenced standards and this Section.

E. DELIVERY, STORAGE AND HANDLING

1. Store materials on site in a area protected from potential damage. Provide loose opaque covers or other protection from sun and rain.

2. Store on skids or other elevated supports.

1.2 PART 2 - PRODUCTS

A. LUMBER MATERIALS

1. Lumber Grading Rules: APA, NFOPA, RIS, WCLIB, and WWPA.
 - a. Lumber Materials: Comply with Chapter 23, Part 2, Title 24.
2. Wood blocking: Provide Douglas Fir No.2 grade for use as blocking, nailers, and similar applications.
 - a. *Use pressure treated wood at all roof applications.*
 - b. *Use fire retardant treated wood for rated roofing applications.*

B. PLYWOOD MATERIALS

1. Sheathing:
 - a. APA rated in accordance with PS 1-09.
 - b. Roof Sheathing: Unless noted otherwise on structural drawings, Structural I Rated Sheathing, minimum Span Rating 32/16, 5 ply, face veneer C-D, Exposure 1, Conventional Type.
 - 1) *Provide fire retardant/preservative treatment at plywood conditions where required by jurisdictional authority.*

C. ACCESSORIES

1. Fasteners:
 - a. Common nails complying with Chapter 23, Part 2, Title 24, CCR, size as required to suit condition, as specified.
 - b. Screws: Stainless steel, minimum # 10 screw, length and type as required for fastening.
 - c. Provide hot dip galvanized steel fasteners at the following applications:
 - 1) Exterior framing exposed to weather.
 - 2) Framing of preservative treated lumber.
 - d. Box nails or "sinkers" are not permitted.
2. Framing Connectors:
 - a. Connector references, unless noted otherwise, are based on products as defined in the latest edition of the Simpson Strong-Tie catalog.
 - b. Use only fasteners as approved for listed connector. Where more than one type of fastener in the referenced series is scheduled, provide fastener with greatest capacity.

3. Bolts:

- a. Bolts: A 307, machine bolts, size and type as indicated, with washers under head and nut. Provide hot dipped galvanized at all conditions defined above for nail fasteners.
- b. Lag Bolts: A 307, cut thread, size and type as indicated, with washers under head. Provide hot dipped galvanized at all conditions defined above for nail fasteners.

D. PRESERVATIVE TREATMENT

- 1. Wood Preservative (Site Application): Water based material system as recommended by AWWA for repair of treated surfaces.
- 2. Wood Preservative (Pressure Treatment):
 - a. Wood shall bear WWP or WCLIB grading stamp and the AWWA Quality mark. AWWA mark shall designate treatment method, retention value and KDAT (kiln dried after treatment).
 - b. Comply with Section 2303.1.9, Chapter 23, Part 2, Title 24, CCR.
 - c. AWWA Treatment U-1, Commodity Specification A using water borne preservative.
 - d. Moisture Content: Kiln Dry all materials after treatment to 19 percent maximum moisture content.

E. FIRE RETARDANT TREATMENT

- 1. *Manufacturer: Hoover or equal.*
- 2. *Treatment Series: Exterior Fire-X*
- 3. *Ratings:*
 - a. *Flame Spread: Maximum flame spread of 25 per ASTM E 84.*
 - b. *Flame Spread Reduction: No reduction in flame spread rating after accelerated weathering test in accordance with ASTM D 2898.*
 - c. *Labeling: Underwriters Laboratory Listed and Labeled.*

F. OTHER MATERIALS

- 1. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

1.3 PART 3 - EXECUTION

A. SURFACE CONDITIONS

- 1. Inspection

- a. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
- b. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
- c. In the event of discrepancy, immediately notify the Architect.
- d. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

B. SITE APPLIED WOOD TREATMENT

1. Brush apply two coats of specified preservative treatment to cut ends, holes, daps, notches, and similar field cuts of pressure treated wood in accordance with AWWPA standards.
2. Allow preservative to cure prior to erecting members.

C. FRAMING

1. Lumber Selection:
 - a. Select individual pieces so that knots and obvious minor defects will not interfere with connection. Install all members with crown and tight knots in the upper position.
 - b. Do not use lumber with end splits or checks greater than the following:
 - 1) 2 x joists: Split length shall be less than or equal to one half the wide face of the member.
 - 2) Beams or headers: Split length shall be less than or equal to the thickness of the member.
2. Erect wood framing members level and plumb. Place horizontal members laid flat, crown side-up.
3. Construct framing members full length without splices.
4. Predrill holes for nails when necessary to prevent splitting, maximum hole size not more than 0.90 times nail diameter.
5. Drill holes for threaded fasteners as follows:
 - a. Wood Screws larger than # 14: Drill lead holes for shank and threaded portion to 7/8 times shank and thread root diameter, respectively.
 - b. Lag screws: Drill lead hole same diameter and depth as shank; drill hole for threaded portion to 0.7 times shank diameter.
 - c. Bolts: Oversize hole by not more than 1/16 inch.
6. Re-tighten all threaded fasteners before covering-up.

7. Cutting:
 - a. Provide all cutting of framing members to accommodate structural members, piping, conduit, ducts, and building system equipment and fixtures.
8. Framing for Connectors
 - a. Where roofing, plaster or other finish occurs, all straps, seats, bolts, and nuts which occur on the exposed exterior face of beams or posts shall be "let-in," dapped or countersunk to be flush with the face of the member.
 - b. Verify amount and method with Architect prior to proceeding.
 - c. Install wood stripping or blocking where indicated on the drawings or required at right angles to supported members and securely nail into place. Space as indicated. Align and level stripping by shimming where necessary. Provide stripping or blocking to conceal all plumbing, conduit, and other items shown installed in framing, whether such stripping is shown or not.

D. PLYWOOD SHEATHING BACKING

1. Secure sheathing edges over firm bearing with specified stainless steel screws. Provide solid blocking at all sheathing edges.
 - a. Provide 1/8 inch spacing between panel edges.

E. TOLERANCES

1. Location: 1/4 inch maximum from true position.

END OF SECTION

SECTION 06 11 00

WOOD FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Structural wall and roof framing.
- B. Wall and roof sheathing.
- C. Roof curbs and cants.
- D. Blocking in wall and roof openings.
- E. Wood furring and grounds.
- F. Concealed wood blocking for support of washroom accessories, wall cabinets, and equipment.
- G. Wood treatment.

1.2 REFERENCES

- A. California Building Code (CBC) 2022 edition.
- B. APA - American Plywood Association.
- C. AWPA – M-4 Standard for the Care of Preservative Treated Wood Products.
- D. AWPA – U1 – Use Category System – User Identification for Treated Wood.
- E. WCLIB - West Coast Lumber Inspection Bureau: Standard Grading Rules No. 17.
- F. WWPA - Western Wood Products Association: Standard Grading Rules.
- G. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- H. ANSI/AF & PA NDS-18 - National Design Specifications for Wood Construction.
- I. ANSI/SDPWS - Special Design Provisions for Wind and Seismic.
- J. ASTM D6109 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber.
- K. ASTM E84 - Standard Test Method for Surface burning Characteristics of Building Materials.
- L. FSC – Forest Stewardship Council.
- M. MS MIL-L-19140 - Fire Retardant Wood Preservative Chemicals.
- N. National Bureau of Standards - Product Standard PS-1-09 for Construction and Industrial Plywood.

1.3 SUBMITTALS

- A. Submit certificate from pressure treatment facility indicating "the wood is free of visible arsenical surface deposits" following treatment.
- B. Submit certificate based on actual moisture content readings performed in accordance with this Section, indicating moisture content of all lumber was 19 percent or less at time of installation.

1.4 QUALITY ASSURANCE

- A. Lumber Grading Agency: Certified by specified agency and approved by Division of State Architect.
- B. Plywood Grading Agency: Certified by specified agency and approved by Division of State Architect.
- C. Provide Certificate of Inspection or grade mark by an approved inspection agency on each piece of lumber and plywood, indicating compliance with applicable standards or grading rules specified in the referenced standards and this Section.
- D. Provide quality mark by an approved inspection agency on each piece of preservative- treated lumber and plywood, indicating compliance with applicable standards or grading rules specified in the referenced standards and this Section.
- E. Provide on-site or other approved quality control program acceptable to Architect and designed to test lumber materials prior to installation in order to demonstrate compliance with moisture content criteria.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store materials on site in a area protected from potential damage. Provide loose opaque covers or other protection from sun and rain.
- B. Store on skids or other elevated supports.
- C. Pile and strip lumber to insure free air circulation. Allow lumber to season as required to achieve specified moisture content prior to installation in building.
- D. Prior to beginning installation, all lumber used shall have a maximum moisture content of 19 percent, unless noted otherwise. Provide written certification, based on moisture meter tests, of compliance acceptable to Owners inspector and Architect.
- E. Prior to finish system installation, protect all sheathing with temporary coverings as required to prevent delamination and splitting.

2 PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: WCLIB, and WWPA.
 - 1. Lumber Materials: Comply with Chapter 23, Part 2, Title 24, CCR.

2. Plywood Sheathing Materials: Comply with requirements of Section 2303, Chapter 23, Part 2, Title 24, CCR.
- B. *Use fire retardant treated wood and plywood as specified in this Section for roof curb and blocking applications.*
- C. Beams and Stringers, 5 inches and thicker, with width more than 1 inch greater than thickness size classification:
 1. Species: Douglas Fir-Larch.
 2. Grade: Unless specified otherwise, No. 1.
 - Provide Select Structural grade at all exposed applications, selected for appearance and straightness.
 3. Surfacing: S4S.
 4. Moisture Content: 19 percent maximum moisture content at time of installation.
 5. Where size permits, provide Free of Heart Center lumber at all exposed applications.
- D. Roof, ceiling and floor joist, 2 to 4 inch thick, 6 inches and wider size classifications:
 1. Species: Douglas Fir-Larch.
 2. Grade: Unless specified otherwise, No. 1 and Better.
 - Provide Select Structural grade at all exposed exterior applications, selected for appearance and straightness.
 3. Surfacing: S4S.
 4. Moisture Content: 19 percent maximum, at time of installation.
 - Provide 15 percent maximum moisture content at vaulted and sloped roof framing members and at all floor framing members at time of installation.
- E. Studs and blocking, 2 to 4 inches thick, 6 inches and wider respectively, all plate stock not in contact with concrete, and all structural light framing size classifications:
 1. Species: Douglas Fir-Larch.
 2. Grade: Unless specified otherwise, No. 1 and Better. (No.2 for Studs and blocking 2 to 4 inches thick, 2 to 4 inches wide)
 - Limit warp to 1/2 of Medium.

DSA SUBMITTAL

- Provide Select Structural grade at all exposed applications, selected for appearance and straightness.
3. Surfacing: S4S.
 4. Moisture Content: 19 percent maximum, at time of installation.
- F. Posts and Timber 5 x 5 inches and larger, width not more than 2 inch greater than thickness:
1. Species: Douglas Fir-Larch.
 2. Grade: No. 1.
- Provide Select Structural grade at all exposed applications, selected for appearance and straightness.
3. Surfacing: S4S.
 4. Moisture Content: 19 percent maximum, at time of installation.
 5. Where size permits, provide Free of Heart Center lumber at all exterior applications.
- G. Sills and Plates in Contact with Concrete and concrete topping: Douglas Fir-Larch species, #2 or better, S4S, pressure treated in accordance with this Section.
- H. Miscellaneous non-load carrying members: Douglas Fir-Larch species, #1 or better grade, S4S, 19 percent moisture content at time of installation.
- I. Roof blocking: Provide Douglas Fir-Larch, No.2 and Better, grade for use as blocking, nailers, and similar applications in contact with roofing materials or flashings.
- J. Use pressure treated wood as specified in this Section for locations in contact with concrete, concrete topping, masonry and for foundation conditions.
- K. *Use fire retardant treated wood and plywood as specified in this Section for interior corridor applications.*

2.2 PLYWOOD MATERIALS

- A. Sheathing:
1. APA rated in accordance with PS 1.
 2. Roof Sheathing: Unless noted otherwise, Structural I Rated Sheathing, minimum Span Rating 32/16, 5 ply, face veneer C-D, Exposure 1, Conventional Type.

DSA SUBMITTAL

- *Provide 1-1/8 inch thick APA 303-OL siding, minimum Span Rating 32/16, minimum 5 ply, MDO overlay, Exposure 1, Conventional Type. Install with MDO surface face down at all exposed walkway trellis conditions.*
 - *Sheathing at Fluid Applied Traffic Topping: Unless noted otherwise, Structural I Rated Sheathing, minimum Span Rating 32/16, 5 ply, face veneer AC, Exposure 1, Conventional Type.*
3. Wall Shear Panels: Unless noted otherwise, Structural I Rated Sheathing, minimum Span Rating 32/16, face C-C, Exposure 1, Group 1 species.
 4. Floor Sheathing: Unless noted otherwise, Structural I Rated Sheathing, APA Rated Sheathing, Exposure 1, square edge, Group 1 species, C-D veneers, thickness as shown on drawings.
 - Provide APA Sturd-i-flor, T and G edge, touch sanded B face veneer at resilient and seamless flooring applications.
 - Provide Exterior exposure durability classification at floor sheathing receiving seamless flooring and at all exterior landings and ramps.
 - Provide preservative treatment at plywood conditions where required by jurisdictional authority.

2.3 ACCESSORIES

A. Nail Fasteners:

1. Common nails complying with Section 2304.10, Chapter 23, Part 2, Title 24, CCR, size as required to suit condition and as specified.
2. Provide hot dip galvanized fasteners at the following applications:
 - Exterior framing exposed to weather.
 - Framing of preservative treated lumber.
 - Interior framing in high humidity areas, such as commercial kitchens and locker rooms.
3. Box nails or "sinkers" are not permitted.
4. Where specified, provide ring shank or screw nails complying with minimum common nail requirements of Table 2304.10.1, Chapter 23, Part 2, Title 24, CCR, at roof and floor plywood sheathing.

B. Framing Connectors:

1. Connector references, unless noted otherwise, are based on products as defined in the latest edition of the Simpson Strong-Tie catalog.

- USP and KC Metals, with equal configuration, structural values and jurisdictional authority approval are approved equals.
 - 2. Alternate connectors submitted to the Architect for consideration as approved equal shall have equivalent ICC Report Number ratings.
 - 3. Use only fasteners as approved for listed connector. Where more than one type of fastener in the referenced series is scheduled, provide fastener with greatest capacity.
- C. Bolts:
- 1. Bolts: ASTM A 307, machine bolts, size and type as indicated, with washers under head and nut. Provide hot dipped galvanized at all conditions defined above for nail fasteners.
 - 2. Lag Bolts: ASTM A 307, cut thread, size and type as indicated, with washers under head. Provide hot dipped galvanized at all conditions defined above for nail fasteners.
- D. Non-Shrink Grout: As specified in Section 03 30 10.
- E. Dry-pack Grout: Type 2 Portland cement grout, ratio of 1.0 part cement to 3.0 parts sand, by volume, with only enough water to assure placement and hydration.

2.4 WOOD TREATMENT

- A. Wood Preservative (Site Application): Water based material system as recommended by AWPA for repair of treated surfaces.
- B. Wood Preservative (Pressure Treatment):
- 1. Wood shall bear WWPA or WCLIB grading stamp and the AWPA Quality mark. AWPA mark shall designate treatment method, retention value and KDAT (kiln dried after treatment).
 - 2. Comply with Section 2303.1.9, Chapter 23, Part 2, Title 24, CCR, except that CCA treatments are not acceptable for conditions exposed to view in the completed project from any point.
 - 3. Above Ground Application: AWPA Treatment UC2, Section 4, using water borne preservative.
 - 4. Ground Contact Application: AWPA Treatment UC-4A using water borne preservative.
 - 5. Moisture Content: Kiln Dry all materials after treatment to 19 percent maximum moisture content.

2.5 FIRE RETARDANT TREATMENT

- A. *Manufacturer: Hoover or equal.*
- B. *Treatment Series: Exterior Fire-X*

C. *Ratings:*

1. *Flame Spread: Maximum flame spread of 25 per ASTM E 84.*
2. *Flame Spread Reduction: No reduction in flame spread rating after accelerated weathering test in accordance with ASTM D 2898.*
3. *Labeling: Underwriters Laboratory Listed and Labeled.*

2.6 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the Contractor and subject to the approval of the Architect.

3 PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Inspection

1. Prior to work of this Section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this Section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 SITE APPLIED WOOD TREATMENT

- A. Brush apply two coats of specified preservative treatment to cut ends, holes, daps, notches, and similar field cuts of pressure treated wood in accordance with AWP A U1 and M4.
- B. Treat the ends of floor joists, girders, blocking and miscellaneous framing as specified.
1. Apply specified preservative to floor members and blocking with bottom edge located 2 feet or less above finished outside grade and in contact with treated sills or concrete/masonry foundation. Apply preservative treatment for 15 minutes to a distance of 6 inches from the end of the member.
 2. Treatment is not required for studs in contact with treated sill plates.
- C. Allow preservative to cure prior to erecting members.

3.3 FRAMING

- A. Lumber Selection:

1. Select individual pieces so that knots and obvious minor defects will not interfere with connection. Install all members with crown and tight knots in the upper position.
2. Do not use lumber with end splits or checks greater than the following:
 - 2 x joists: Split length shall be less than or equal to one half the wide face of the member.
 - Beams or headers: Split length shall be less than or equal to the thickness of the member.
- B. Erect wood framing members level and plumb. Place horizontal members laid flat, crown side-up.
- C. Frame wall intersections with 3 continuous studs or as indicated on drawings.
- D. Construct framing members full length without splices.
- E. Provide multiple members at openings where indicated.
 1. Form with double trimmer studs at each side, with header resting on trimmer studs, unless otherwise shown or noted. Provide single king stud each side of opening unless shown otherwise on structural drawings. Provide double sill at all cripples.
- F. Construct double joist headers at roof openings unless shown otherwise. Frame rigidly into joists.
- G. Continuously bridge joists more than 8 inch depth with solid blocking, spaced eight feet on center. Provide close fitted solid blocking at ends of members.
- H. Predrill holes for nails when necessary to prevent splitting, maximum hole size not more than 0.90 times nail diameter.
- I. Drill holes for threaded fasteners as follows:
 1. Wood Screws larger than # 14: Drill lead holes for shank and threaded portion to 7/8 times shank and thread root diameter, respectively.
 2. Lag screws: Drill lead hole same diameter and depth as shank; drill hole for threaded portion to 0.7 times shank diameter.
 3. Bolts: Oversize hole by not more than 1/16 inch.
- J. Re-tighten all threaded fasteners before covering-up.
- K. Install sills and plates as follows:
 1. Install preservative treated sills and plates in accordance with 2304.12.1.2, Chapter 23, Part 2, Title 24, CCR.
 2. Bolt to foundations and slabs. Place washers and nuts tightened to level bearing.

3. Provide double top plate in all partitions and walls. Stagger joints in the upper and lower members of the top plate not less than 4 feet. Splice top plates with a minimum of 12-16d each side of splice unless otherwise shown on the drawings.

L. Cutting:

1. Provide all cutting of framing members to accommodate structural members, piping, conduit, ducts, and building system equipment and fixtures.
2. Obtain Architects and DSA approval prior to cutting of structural framing not detailed on structural drawings.
3. Notching: Notching is not permitted in framing without DSA and Architect's written approval.
4. Joists over 8 inches in depth may have maximum 2 inch diameter holes bored at the joist center and within the middle third of the span.
5. Holes: Bored holes may be placed in studs and sills provided they are accurately centered a minimum of 12 inches apart and not over 33% of the stud/sill width in diameter.
 - Plates: Bored holes are not permitted without DSA and Architect's approval.
 - Sills: Sills may be completely cut each side of a pipe or conduit provided an additional anchor bolt or approved anchor is placed within 5 -9 inches of the end of the sill on each side of the pipe or conduit.

M. Framing for Connectors

1. Where roofing, plaster or other finish occurs, all straps, seats, bolts, and nuts which occur on the exposed exterior face of beams or posts shall be "let-in," dapped or countersunk to be flush with the face of the member.
2. Verify amount and method with Architect prior to proceeding.

N. Blocking and Backing Installation

1. Provide fire blocking at all concealed framing areas and spaces per Section 718.2 Chapter 7, Part 2, Title 24, CCR. Fire blocking shall be solid framing material, 2x minimum, or approved alternate.
2. Provide draft stops at all concealed framing areas and spaces per Section 718.2, Chapter 7, Part 2, Title 24, CCR. Draft stops blocking shall be solid panels complying with referenced section and as approved by Architect.
3. Provide solid blocking at locations necessary for fastening or installing subsequent finish materials and/or products. Install as required to provide flush surface in final installation.

4. Where wall sheathing is not continuous at wall surfaces, provide non-structural wall sheathing or shimming as necessary to fill in, furr out and align with structural wall sheathing with subsequent finish materials.
5. Install wood stripping where indicated on the drawings or required at right angles to supported members and securely nail into place. Space as indicated. Align and level stripping by shimming where necessary. Provide stripping or blocking to conceal all plumbing, conduit, and other items shown installed in framing, whether such stripping is shown or not.
6. Provide all wood grounds and nailers, shaped as shown or required. Provide required backing for all trim wall finish, cabinets, light fixtures, mechanical plumbing and electrical apparatus, include boxing required for flush installations. Coordinate with work in other Sections for rough-in dimensions.
7. Provide 2 x 4 flat solid blocking at all plywood roof sheathing edges, whether shown or not, and including roof penetrations and openings. Coordinate with work in other Sections for rough-in dimensions.

3.4 SHEATHING

- A. Secure roof sheathing with face grain perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Provide solid blocking at all sheathing edges. Use of ply-clips is not acceptable.
 1. Attachment of roof sheathing may be accomplished by machine nailing subject to approval of the Architect and DSA inspector. Over penetration of the face ply or improper maintenance of edge distances will be cause for rejection or termination of use.
 2. Provide 1/8 inch spacing between panel edges.
 3. At horizontal diaphragms, install sheathing in minimum 4 x 8 foot full size sheets wherever possible.
 - Where construction does not permit full size sheets, provide minimum 2 foot wide sheathing panel dimension.
- B. Secure floor sheathing with face grain perpendicular to framing members with ends staggered. Secure sheet edges over firm bearing. Use solid blocking at all sheathing edges.
 1. Install using approved threaded or ring shank fasteners, flush but not below face veneer. At all resilient flooring conditions, fasten at maximum 6 inches on center spacing. Do not fill fasteners.
 2. Provide approved adhesive at all panel edges and at all supporting framing. Glue in accordance with APA AFG 01 System criteria.
 3. Provide 1/8 inch spacing between panel edges.

4. At horizontal diaphragms, install sheathing in minimum 4 x 8 foot full size sheets wherever possible.
 - Where construction does not permit full size sheets, provide minimum 2 foot wide sheathing panel dimension.
- C. Secure wall sheathing with face grain perpendicular or parallel to wall studs, with ends staggered, over firm bearing.
 1. Provide 1/8 inch spacing between panel edges.
 2. At vertical diaphragms, install sheathing in minimum 4 x 8 foot full size sheets wherever possible.
 - Where construction does not permit full size sheets, provide minimum 12 inch wide sheathing panel dimension.
- D. Where specified, place building paper over wall sheathing; weatherlap joints.
- E. Place temporary protection over floor and roof sheathing as required to protect sheathing from delamination and splitting.

3.5 TOLERANCES

- A. Location: 1/4 inch maximum from true position.
- B. Plumb: Limit wall framing deviation from plumb to a maximum of 1/4 inch over 10 feet, non-cumulative.
- C. Line: Limit wall framing deviation from line to a maximum of 1/4 inch in any 10 foot length, non-cumulative.

END OF SECTION

SECTION 06 17 33

WOOD I-JOISTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Wood chord and structural panel web joists for floor and roof framing.
- B. Bridging, bracing, and anchorage.
- C. Framing for openings.

1.2 REGULATORY REQUIREMENTS

- A. *Comply with Chapter 16 and 23 of Part 2, Title 24, CCR.*

1.3 REFERENCES

- A. California Building Code (CBC) 2022 edition
- B. APA - American Plywood Association.
- C. UL - Fire Resistance Directory.
- D. ALSC - American Lumber Standards Committee: Softwood Lumber Standards.
- E. ASTM D2559 - Adhesives for Structural Laminated Wood Products for use Under Exterior Exposure Conditions.
- F. ASTM D5055 - Standard Specification for Establishing and Monitoring Capabilities of Pre-Fabricated Wood I - Joists.
- G. FSC - Forest Stewardship Council.
- H. ICC - (International Code Council) Evaluation Service, Inc.
- I. National Bureau of Standards - Product Standard PS-1-95 for Construction and Industrial Plywood.

1.4 QUALITY ASSURANCE

- A. Manufacturer
 - 1. Manufacturer shall have produced the specified products for a period of five (5) years prior to beginning work of this section, and shall have the capability to produce the specified products to the delivery and quantity criteria of the project.
 - 2. Manufacturer shall submit documentation demonstrating compliance with jurisdictional authority approved quality control program, including in-plant inspection by an approved testing and inspection laboratory.

B. Fabricator/Erector

1. For fabrication and installation of work, use only personnel who are thoroughly trained and experienced in the skills required, have installed similar applications of the specified products within one year prior to beginning work of this section, and who are completely familiar with the manufacturers' recommended methods of installation, as well as the requirements of this work.

C. Substitution requirements of alternate I-Joist systems.

1. Submit substitutions per provisions of Section 01 25 00.
2. Current ICC Evaluation Service Report, is a prerequisite to consideration under the provisions of Section 01 25 00.
3. Proposed alternate shall have same Section Modulus or greater and the product of the Moment of Elasticity and Moment of Inertia (EI) as the specified product. Alternate joist dimensions and depths will not be allowed without the specific approval of the Architect and the Structural Engineer.
4. No Change Order for extension of time for any cause will be allowed in relationship to any proposed alternative product. No time extensions will be permitted for substitutions.
5. Continuous inspection of fabrication and testing by a special inspector approved by the Local Governing Agency will be required for all substitutions. Cost of such inspection shall be paid by the Owner and back-charged to the Contractor. Test methods required to demonstrate equivalency to the specified I-joist shall be determined by the Architect and the Structural Engineer.
6. The Contractor shall pay all filing and review fees caused by the substituted I-joist system, including joists, sheathing, bridging and related components, blocking and installation of the alternate system.
7. The additional cost of design, engineering, review by Architect and Structural Engineer and all costs of construction resulting from the use of the substituted I-joist system shall be paid by the Contractor.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Shop Drawings:

1. Submit shop drawings prepared under supervision of a civil engineer, licensed in the State of California.
2. Shop drawings shall include complete details and procedures and diagrams. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate framing system, sizes and spacing of joists, loads and joist cambers, bearing and anchor details, bridging and bracing, and framed openings.

DSA SUBMITTAL

3. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as work of other sections.
 4. Shop drawings shall clearly identify, in graphic form, all deviations from contract documents. Provide complete description and rationale for deviation.
 5. Clearly identify all changes made in re-submitted shop drawings. Incorporate changes necessary due to field conditions in re-submittal.
- C. Product Data/Materials List
1. Submit producer's or manufacturer's specifications and installation instructions. Include laboratory test reports and other data to show compliance with specifications, including specified standards.
- D. Engineering Submittal Criteria:
1. Submit calculations prepared under the direct supervision of a Civil Engineer licensed in the State of California.
 2. Structural Calculations: Produce calculations in booklet form, 8-1/2 x 11 inch size. Conform to the requirements of Section 4-317, Part 1, Title 24, CCR.
 3. Provide sufficient information with respect to design criteria, analysis methodology and material capacity to adequately evaluate proposed structural system for compliance with applicable sections of Title 24, CCR.
- E. Fire Resistive Assemblies:
1. After reviewing all relationships and building system components, provide written certification that specified system will provide fire resistive assembly as shown on drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 60 00. Store and protect products under provisions of Section 01 60 00.
- B. Transport and store joists in vertical position resting on bearing ends.
- C. Protect joists from moisture, warping, and distortion during transit and when site stored.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements are as shown on shop drawings.

2 PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Redbuilt, www.redbuilt.com, or approved equal.

- B. Series: Red-I I-Joist, as shown on drawings and as specified in this Section
- C. Characteristics:
 - 1. Chord: Micro-laminated LVL per ICC Report ESR-2994.
 - 2. Web: Performance Plus Oriented Strand Board (OSB), meeting APA PS-2 criteria, Exposure 1, minimum 7/16 inch thickness, and complying with ICC ESR 1153.
 - 3. Joist Bridging: Type, size and spacing required by joist manufacturer, and as shown on drawings.

2.2 ACCESSORIES

- A. Wood Blocking, Plates, Support Members, and Framing for Openings: Per Section 06 11 00.
- B. Fasteners: Steel, type to suit application and per Section 06 11 00.

2.3 FABRICATION

- A. Verify dimensions and site conditions prior to fabrication.
- B. Design joists in accordance with approved *CBC* standards. Provide system designed for dead and live loads as shown on drawings.
 - 1. Dead Loads: Carefully review drawings and referenced sections of this specification. Design structural system to respond to loads imposed by such materials and assemblies as specified.
 - 2. Deflection: Limit deflection as indicated on drawings.
- C. Include all extended ends and ceiling extensions, headers, bridging, shear blocks and panels, end supports, and end anchors required for complete installation

2.4 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

3 PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
 - 1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
 - 2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.

3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 INSTALLATION

- A. Install joists in accordance with manufacturer's instructions.
- B. Place joists true to line and level. Provide temporary bracing to position joists in place until permanently secured.
- C. Place permanent bridging, bracing, and anchors to maintain joists straight and in correct position before installation of decking or inducing loads.
- D. Do not field cut joist flanges.
- E. Place headers and supports to frame openings required.

3.3 ERECTION TOLERANCES

- A. Tolerances shall not be cumulative.
- B. Install joists aligned within 1/4 inch of true location.
- C. Install joist plumb and level, plus or minus 1/4 inch in 10 feet.

END OF SECTION

SECTION 06 18 00

GLUE-LAMINATED CONSTRUCTION

1. PART 1 - GENERAL

1.2 SECTION INCLUDES

- 1.1.1. Structural glue laminated wood beams.
- 1.1.2. Steel hardware and attachment brackets.

1.3 REFERENCES

- A. California Building Code (CBC) 2022 edition.
- B. ANSI/AITC A190.1 – American National Standard for Wood Products – Structural Glued Laminated Timber.
- C. ASTM D 2559 - Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions.
- D. ASTM D 3737 – Standard Practice for Establishing Allowable Properties for Structural Laminated Timber (Glulam).

1.4 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture of glue laminated structural units with five years minimum experience, certified by the AITC, and approved by DSA.
- B. Grade Stamp: Grade stamp each beam with AITC Quality Mark or other approved grade marking.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01 33 00.
- B. Indicate framing system, sizes and spacing of members, loads and cambers, bearing and anchor details, bridging and bracing
- C. Provide technical data on wood preservative materials, application technique, and resultant performance information.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01 60 00.
- B. Store and protect products under provisions of Section 01 60 00.
- C. Protect members in accordance with AITC requirements; bundle wrap concealed beams, individually wrap beams that will be exposed to view.
- D. Leave individual wrapping in place until finishing occurs. Open ends of wrapping and loosen at job site to facilitate air circulation.

2 PART 2 - PRODUCTS

2.2 GLUE LAMINATED TIMBER: EXTERIOR APPLICATIONS

- A. Lumber: Douglas Fir-Larch, Section 2303, Chapter 23, Part 2, Title 24, CCR.
- B. Grade: Architectural Appearance Grade.
- C. Finish: Smooth Surfaced.
- D. Adhesive: Exterior wet use type, complying with ASTM D 2559; for wet use condition.
 - 1. *No added urea formaldehyde is to be used on glue laminated timber placed on the interior of the project whether shop applied or applied on-site.*
- E. Structural Rating: 24F – V8, DF/DF.
- F. Condition of use: Wet (*Dry - seldom*).

2.3 GLUE LAMINATED TIMBER: INTERIOR APPLICATIONS

- A. Lumber: Douglas Fir-Larch, Section 2303, Chapter 23, Part 2, Title 24, CCR.
- B. Grade: Architectural Appearance Grade.
- C. Finish: Smooth Surfaced.
- D. Adhesive: Exterior wet use type, complying with ASTM D 2559; for wet use condition.
 - 1. *No added urea formaldehyde is to be used on glue laminated timber placed on the interior of the project whether shop applied or applied on-site.*
- E. Structural Rating: 24F-V8, DF/DF.
- F. Condition of use: Dry (*Wet if MC greater than 16 per - seldom*).

2.4 FABRICATION

- A. Fabricate glue laminated structural members in accordance with Section 2303.1.3, Part 2, Title 24, CCR and ANSI/AITC Standard A190.1 for specified Grade.
- B. Verify dimensions and site conditions prior to fabrication.
- C. Cut and fit members accurately to length to achieve tight joint fit.
- D. Fabricate member with camber built in.
- E. Do not splice or join members in locations other than that indicated, without permission of Architect, Structural Engineer.

- F. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
- G. Separate all end joints in adjacent laminations in accordance with ANSI/AITC A190.1.
 - 1. Areas requiring 6 inch spacing are shown on drawings.
 - 2. Where occurs, separate joints in adjacent laminations of arched members as required for bending members.
- H. Control moisture content at time of gluing and fabrication in accordance with Section 2303.1.3, Chapter 23, Part 2, Title 24, CCR, and as follows:
 - 1. Maximum moisture content at time of gluing: *12 percent // 10 percent for projects located in desert areas//16 percent for projects in coastal areas.*
 - 2. Minimum moisture content at time of gluing: 7 percent.
 - 3. Maximum moisture content at time of gluing for members exposed to direct sunlight in the finished structure: *10 percent // 12 percent for Alaskan Cedar.*
 - 4. Range of moisture content of laminations assembled into a single member at time of gluing: 5 percent.
- I. Notches: No notching or boring permitted, unless specifically detailed.
- J. Dry-use type adhesives are not permitted.

2.5 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for complete and proper installation of this work, as selected by the contractor and subject to the approval of the Architect.

2.6 SOURCE QUALITY CONTROL

- A. Continuous fabrication inspection to be provided for under the provisions of Section 01 45 29.
 - 1. Glue-Laminated Timber: Section 1705A.5.4, Chapter 17A, Part 2, Title 24, CCR, ANSI/AITC Standard A190.1 and ASTM D 3737 for specified Grade.
 - 2. Provide verified report certifying inspection in compliance with Section 01 45 29 of this Project Manual and 170A.6, Chapter 17, Part 2, Title 24, CCR. ANSI certification is not acceptable.

3 PART 3 - EXECUTION

3.2 SURFACE CONDITIONS

- A. Inspection

1. Prior to work of this section, carefully inspect previously installed work. Verify all such work is complete to the point where this installation may properly commence.
2. Verify that work of this section may be installed in strict accordance with the original design, all pertinent codes and regulations, and all pertinent portions of the referenced standards.
 - Verify sufficient end bearing area is provided.
3. In the event of discrepancy, immediately notify the Architect.
4. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.3 PREPARATION

- A. Coordinate placement of bearing support items.

3.4 ERECTION

- A. Set structural members level and plumb, in correct positions.
- B. Provide temporary bracing and anchorage to hold members in place until permanently secured.
- C. Fit members together accurately without trimming, cutting, or any other unauthorized modification.

3.5 TOLERANCES

- A. Framing Members: 1/4 inch maximum from true position.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide mill fabricated architectural woodwork with accessories as required for complete finished installation including cabinetwork hardware.
 - 1. Provide custom wood cabinetwork.
 - 2. Provide countertops.
- B. Related Sections:
 - 1. Section 06 10 53: Miscellaneous rough carpentry.

1.2 REFERENCES

- A. North American Architectural Woodwork Standards, 3.1 (NAAWS).

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's literature for manufactured items.
- B. Shop Drawings: Indicate materials and wood species, component profiles, fastening, joining details, finishes, and accessories.
 - 1. Certification: Provide Woodwork Institute Certified Compliance Label on shop drawings.
- C. Samples: Furnish samples of each exposed finish.
 - 1. Veneers: After approval of type of wood for veneer submit not less than three potential flitches of matching wood veneers to be reviewed by Architect each with enough veneering available for Project.
 - a. Where Architect cannot visit location of flitch do factory floor layout of flitch indicating total appearance on casework and submit photographs with true color of each flitch.
 - 2. Furnish samples of each exposed casework hardware.
 - 3. Furnish samples of wood paneling showing corner and edge treatment.

1.4 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for adhesives, sealants, and caulks, for composite wood products formaldehyde limitations, and for paints and coatings.

- B. Fabricator Qualifications: Member of Sponsor of North American Architectural Woodwork Standards with minimum five years successful experience fabricating woodwork like that required for Project.
- C. Standards: Perform architectural woodwork in accordance with North American Architectural Woodwork Standards (NAAWS).
 - 1. Certified Compliance Program (CCP): Comply with Woodwork Institute "Certified Compliance Program (CCP)" as defined in NAAWS.
- D. Seismic Anchorage: Provide seismic anchorage for wall cabinets as required by California Code of Regulations (CCR), Title 24, Part 2.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver architectural woodwork until site conditions are adequate to receive work; protect items from weather while in transit.
 - 1. Allow architectural woodwork shop finish to completely dry prior to delivery to site; allow materials to off-gas volatile organic compound (VOC) emissions off site.
- B. Store materials indoors, in ventilated areas with constant but minimum temperature of 60-degrees F and maximum relative humidity of 25% to 55%.
- C. Do not begin installation of architectural woodwork until space is fully enclosed and mechanical systems are fully operational.
 - 1. Maintain interior installation areas at 70 degrees F and 50% to 55% relative humidity.
- D. Immediately remove from site materials with visible mold and materials with mildew.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide mill fabricated architectural woodwork with accessories as required for complete finished installation including cabinet hardware.
- B. Plastic Laminate Finished Casework and Countertops:
 - 1. Quality: NAAWS/Custom Grade frameless, flush overlay, unless otherwise indicated.
 - a. Special: Provide each single length section of casework in largest such sections as access and openings allow.
 - 1) Multiple self-supporting units fastened together to form larger unit allowed only where access and openings do not allow single lengths.
 - 2. Plastic Laminates:

- a. Types: NEMA LD-3.1 high pressure laminates.
 - 1) Horizontal Surfaces: General Purpose Type, nominal 0.050".
 - 2) Vertical Surfaces: Vertical Surface Type, nominal 0.032".
 - 3) Unexposed Surfaces: Balanced with 0.030" melamine backing sheet.
 - 4) Formed Surfaces: Postforming Type, nominal 0.042".
- b. Solid Color Laminates:
 - 1) Formica Corp.
 - 2) Wilsonart, Wilsonart Engineered Surfaces/Solicore.
 - 3) Substitutions: Refer to Section 01 25 00.
- 3. Wood Core: Plywood or medium density fiberboard (MDF) or particleboard, with no added formaldehyde and free of toxic materials.
- C. Casework Hardware: Provide casework hardware items as required for complete installation as indicated; provide types as listed in North American Architectural Woodwork Standards for casework, but no less than following types.
 - 1. Plug-In Pin Type Shelf Supports (Transparent Finished Casework): Match BHMA A156.9 B04013 spoon type plug-in supports; provide holes 1" on center.
 - 2. Adjustable Shelf Standards and Supports (Plastic Laminate and Opaque Painted Casework): Match BHMA A156.9 B04073 adjustable standards and B04083 closed shelf rest brackets for mortis mounting; flush mounted in cabinet.
 - 3. Cabinet Hinges: BHMA A156.9 B01602 or B01603 frameless European concealed type, minimum 160 degree opening, with spring closer.
 - 4. Cabinet Pulls: Back mounted wire type, 4" center to center, clear aluminum; as approved by Architect.
 - 5. Drawer Slides: Full extension, rail mounted type, minimum 100 lb. capacity with ball-bearing rollers; self-closing.
 - a. Manufacturers:
 - 1) Accuride.
 - 2) Knappe & Vogt.
 - 3) Blum.
 - 4) Hettich International.
 - 5) Substitutions: Refer to Section 01 25 00.
 - 6. Cabinet Locks: Pin and tumbler slide bolt lock with five pin tumblers as approved by Architect, two keys each.
 - 7. Magnetic Catches: BHMA 156.9 B03141.

- D. Quartz-Based Solid Polymer Countertops: Manufacturer's standard quartz-based polymer system with color throughout thickness; provide manufacturer recommended joint adhesive; exposed surfaces finished to match top.
 - 1. Manufacturers:
 - a. Dal-Tile Corp.
 - b. CaesarStone USA/CaesarStone
 - c. Cambria USA/Cambria Countertops.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Quality: NAAWS/Premium Grade.
 - 3. Type: Not less than 1/2" thick sheet; coordinate with sink bowls as indicated and as specified in Division 22.

2.2 FABRICATION

- A. General: Fabricate architectural woodwork in accordance with specified North American Architectural Woodwork Standards.
- B. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Make corners and joints hairline; slightly bevel arises.
 - 1. Locate butt joints at least 2'-0" from cutouts.
 - 2. Cap exposed edges with plastic laminate of same finish and pattern.
 - 3. Apply laminate backing sheet to reverse side of laminate surfaces.
 - 4. Provide cutouts for inserts, fixtures and fittings; verify locations from on-site dimensions.
 - 5. Prime paint contact surfaces of cutouts.
- C. Countertops: Provide maximum sizes available. Locate butt joints at least 2'-0" from cutouts where more than one-piece countertops are required.
 - 1. Make corners and joints hairline; slightly bevel arises.
 - 2. Provide cutouts for inserts, fixtures and fittings; verify locations from on-site dimensions.
 - 3. Splashes and edges as indicated or as directed by Architect where not otherwise indicated.
- D. Use exposed fastening devices or nails only when approved and unavoidable; arrange neatly.
- E. Assemble woodwork in shop in sizes easily handled and to ensure passage through building openings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication where possible; do not delay job progress, allow for trimming and fitting.

3.2 INSTALLATION

- A. Install work consistent with Architectural Woodwork Standards specified quality grade, plumb, level, true and straight with no distortions.
 - 1. Shim as required, using concealed shims.
- B. Ensure mechanical and electrical items affecting architectural woodwork are properly placed, complete, and have been inspected by Architect prior to commencement of installation.
- C. Secure work to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation.
- D. Scribe and cut for accurate fit to other finished work.
- E. Install architectural woodwork under supervision of factory-trained mechanics.
- F. Attach architectural woodwork securely in place with uniform joints providing for thermal and building movements.
- G. Paneling: Provide fire-treated wood stops eight feet on center at paneling where required by applicable codes when paneling is not direct applied to substrate.
- H. Acceptable Tolerances:
 - 1. Variation from True Position: Maximum 1/16" at any position and maximum 1/8" in any 10'-0" length.
 - 2. Adjoining Surfaces of Same Material: No variation permitted.
 - 3. Offset with Abutting Materials: Maximum 1/32".

END OF SECTION

SECTION 07 19 00

WATER REPELLENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide clear liquid penetrating type water repellent coating.
 - 1. Location: Apply water repellent to following exterior exposed surfaces.
 - a. Concrete unit masonry.
 - b. Integral color Portland cement plaster.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene not less than one week prior to commencing work of this Section. Require attendance of those directly affecting work of this Section.
 - 1. Review installation procedures and coordination required with related work.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's literature.
- B. Samples: Submit sample units with water repellent coating applied to half of each sample face; indicate which half has coating.

1.4 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for paints and coatings.
- B. Qualification of Installers: Firm with minimum five years successful experience in projects of similar scope.
- C. Mock-Up: Prior to commencing work, including bulk purchase and delivery of material, prepare small application in unobtrusive location of typical substrate in manner acceptable to Architect.
 - 1. Proceed only after Architect's acceptance of test application or as otherwise directed.

1.5 SITE CONDITIONS

- A. Do not apply coating during inclement weather, when air temperature is below 50-degrees F, or when rain or temperatures below 40-degrees F are predicted for a period of 24 hours.
- B. Do not apply coating earlier than 3 days after surfaces became wet.

- C. Do not apply coating to damp, dirty, dusty, or otherwise unsuitable surfaces.
 - 1. Allow concrete surfaces to cure minimum 28 days unless otherwise approved in writing by coating manufacturer.
- D. Protect glass, glazed products, and landscaping from contact with water repellent coating; replace materials damaged by water repellent coating.

1.6 WARRANTY

- A. Extended Correction Period: Provide for correcting failure of water repellent coating to resist penetration of water.
 - 1. Period: Two years.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. ProSoCo/Sure Klean SL 100.
- B. BASF Master Builders/MasterProtect H 1000 System.
- C. Chemprobe Products Industries Inc./CP-500W.
- D. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide silane or siloxane based clear liquid water repellent coating which does not affect appearance of coated material.
- B. Performance Requirements: Provide products which are recommended by manufacturer to be fully compatible with indicated substrates and joint sealers which are in contact with water repellent coating.
- C. Regulatory Requirements: Provide materials maximum volatile organic compound (VOC) emissions as required by applicable codes and regulations.
 - 1. Comply with applicable air quality management authority.
- D. Water Repellent Coating: Manufacturer's standard penetrating type silane or siloxane-based sealers specified conforming to applicable limitations on volatile organic compounds.
 - 1. Provide specific systems as recommended by manufacturer for substrates involved.
 - 2. Finish: Water repellent coating shall not alter appearance, color, or texture of substrate under any lighting conditions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates and apply coating in strict accordance with manufacturer's recommendations.
- B. Clean surfaces of dust, dirt and foreign matter detrimental to proper installation of water repellent coating.
- C. Assure coating compatibility with each type of joint sealer within or adjacent to surfaces receiving waterproof coating.
 - 1. Mask surfaces indicated to receive joint sealers which would be adversely affected by coating.

3.2 APPLICATION

- A. Apply coating in accordance with manufacturer's instructions including maximum allowable coverage.
- B. Take special care to prevent damage to adjacent materials from application of coating; repair or replace materials damaged due to application of coating.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide insulation and accessories as required for complete installation.
 - 1. Provide thermal batt insulation with integral vapor retarder.
 - 2. Provide poly-scrim faced batt insulation for exposed interior applications.
 - 3. Provide thermal board insulation with integral vapor retarder.
 - 4. Provide nailable surface polyisocyanurate thermal board roof insulation.
 - 5. Provide vapor retarder at interior of exterior surfaces with no other vapor retarder.
- B. Related Work:
 - 1. Section 07 24 00: Insulation integral with exterior insulation and finish system.
 - 2. Section 07 53 10: Insulation integral with elastomeric PVC membrane roofing.
 - 3. Section 07 81 00: Applied fireproofing.
 - 4. Section 07 84 00: Firestopping.
 - 5. Section 09 21 00: Acoustical insulation concealed in gypsum board systems.

1.2 ADMINISTRATIVE REQUIREMENTS

- A. Interior Vapor Retarders: Where specifications require foil faced vapor retarders as part of building thermal insulation system, intent is to prevent migration of spores from mold and mildew into interior building spaces.
 - 1. Intent is to provide air barrier and vapor retarder on interior surface while allowing vapor to move through exterior wall vapor permeable surfaces, while vapor permeable water barriers are maintained at exterior side of wall.

1.3 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature for each type of insulation.
 - 1. Submit Underwriter's Laboratory approval numbers for required fire ratings; approvals of other laboratories contingent upon acceptance of applicable authorities.

1.4 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to energy efficiency.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide thermal insulation with accessories.
- B. Thermal Batt Insulation: Preformed slag mineral or glass fiber with thermosetting resin binders, conforming to ASTM C665; formaldehyde-free.
 - 1. Manufacturers:
 - a. Johns Manville/FSK-25 Thermal-Shield Insulation.
 - b. Owens-Corning Fiberglas Corp./Fiberglas FS-25 Insulation.
 - c. CertainTeed/Thermafiber FS25 Insulation.
 - d. Substitutions: Refer to Section 01 25 00.
 - 1. R-Value: Minimum R-19 at walls, R-30 at horizontal surfaces, unless otherwise indicated.
 - 2. Flame Spread/Smoke Developed Rating: Maximum 25/450, ASTM E84.
 - 3. Vapor Retarder: Type III, aluminum vapor retarder on one side.
 - 4. Vapor Retarder: Type I: No vapor retarder.
 - 5. Combustibility: Pass ASTM E136.
 - 2. R-Value: Minimum R-19, unless otherwise indicated.
 - 3. Flame Spread/Smoke Developed Rating: Maximum 25/450, ASTM E84.
 - 4. Vapor Retarder: Type III, aluminum vapor retarder on one side.
- C. Thermal Batt Exposed Ceiling Insulation: Preformed batt insulation with white poly-scrim-kraft or similar vapor retarder facing meeting specified fire rating and intended for exposed applications. Provide at exposed to structure rooms as indicated on plans.
 - 1. Manufacturers:
 - a. CertainTeed/Post Frame Poly-Scrim-Kraft (PSK) Fiber Glass Insulation.
 - b. Substitutions: Refer to Section 01 25 00.
 - 2. R-Value: Minimum R-38, unless otherwise indicated.
 - 3. Flame Spread/Smoke Developed Rating: Maximum 25/450, ASTM E84.
- D. Thermal Board Insulation: Preformed slag mineral or glass fiber with thermosetting resin binders forming rigid board, conforming to ASTM C612.
 - 1. Manufacturers:
 - a. Johns Manville/Insul-Shield Insulation.

- b. Owens-Corning Fiberglas Corp./Fiberglas 700 Series Insulation.
 - c. CertainTeed/CertaPro Commercial Board Insulation.
 - d. Substitutions: Refer to Section 01 25 00.
- 2. Thickness: Minimum 1" unless otherwise indicated; fill furring channel space between wall and gypsum board.
- 3. Flame Spread/Smoke Developed Rating: Maximum 25/450, ASTM E84.
- 4. Combustibility: Pass ASTM E136.
- 5. Vapor Retarder: Type I, unfaced.
- 6. Vapor Retarder: Type III: Aluminum vapor retarder on one side.
- E. Thermal Board Insulation with Foil Face: Provide foam insulation intended for use with roofing systems; with foil facing, conform to ASTM C1289, Type I, Class I. Coordinate with 07 53 10 Elastomeric PVC Membrane Roofing
 - 1. Manufacturers:
 - a. Dow Chemical Co./Thermax Metal Building Board or Thermax Sheathing.
 - b. Atlas Roofing Corp./ACFoam Supreme.
 - c. RMAX, Inc./Thermarook Plus-3.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Thickness: As indicated on Drawings.
 - 3. Thermal Resistance: Not less than R-30 total Long-Term Thermal Resistance (LTTR) unless otherwise indicated.
- F. Continuous Insulation at Exterior Walls (Exposed to Water): ASTM C1289, Type I, Class I foam insulation designed specifically for continuous insulation at exterior walls and acceptable for application over weather barrier/underlayment.
 - 1. Manufacturers:
 - a. Dow Chemical Co./Thermax ci Exterior Insulation.
 - b. Hunter Panels/Xci Products.
 - c. Atlas Roofing Corporation/EnergyShield Continuous Wall Insulation.
 - d. Rmax/ECOMAXci System.
 - e. Substitutions: Refer to Section 01 25 00.
 - 2. Basis of Design: Dow Chemical Co./Thermax ci Exterior Insulation.
 - 3. Seal joints, penetrations, and perimeters with Dow/Liquidarmor CM Sealant and Flashing or comparable materials by other specified manufacturers.
 - 4. Standards: Provide insulation approved for UL U424 fire tested assemblies and for NFPA 285.
 - 5. Thickness/r-Value: Thick as indicated, with minimum r-5 per inch.

- G. Continuous Exterior Insulation: See 07 24 00 Exterior Insulation and Finish System
- H. Separate Vapor Retarder (Interior of Exterior Walls): Provide reinforced polyethylene or foil-polyester film vapor retarder; maximum permeance rating of 0.13 perm.
 - 1. Manufacturers:
 - a. Raven Industries, Inc./Dura-Skrim 6ww.
 - b. Reef Industries, Inc./Griffolyn T-65.
 - c. Alumiseal Corp./Zero Perm.
 - d. Substitutions: Refer to Section 01 25 00.
- I. Accessories: Furnish as recommended by insulation manufacturer for insulation types, substrates, and conditions involved.
 - 1. Fasteners and Attachment Devices: Comply with insulation manufacturer recommendations for attachment of insulation.
 - 2. Fasteners to withstand loads specified for system.
 - 3. Vapor Retarder Tape: Minimum 2" wide self-adhering type designed to maintain vapor retarder integrity and complying with fire resistance ratings as required by applicable codes.
 - 4. Penetration Type Insulation Supports: Galvanized or electroplated steel penetration supports with adhesive attachment to substrate and support disc.
 - 5. Hat Channels for Special Fibrous Continuous Insulation: Types as indicated and as recommended by insulation manufacturer for applications indicated.
 - 6. Thermal Break Insulation Supports for Continuous Insulation: Provide attachment system designed specifically for supporting both continuous insulation and exterior building cladding systems indicated.
 - a. Manufacturers:
 - 1) Armatherm (844.360.1036)/Armatherm Z Girt Structural Thermal Break.
 - 2) Knight Wall Systems (855.597.9255)/CI or HCI System.
 - 3) Substitutions: Refer to Section 01 25 00.
 - b. Provide system recommended by manufacturer for applications indicated with accessories as required for complete thermally-broken continuous insulation system in configurations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate and adjacent materials are dry and ready to receive insulation; beginning installation signifies acceptance of conditions.
- B. Ensure mechanical and electrical items affecting work are properly placed, complete, and have been inspected by Architect prior to commencement of installation.

3.2 INSTALLATION

- A. General: Install insulation in accordance with manufacturer's instructions and applicable code requirements. Cut and trim insulation neatly, to fit spaces.
 - 1. Fit insulation tight within spaces and tight to and behind mechanical and electrical services within insulation plane; leave no gaps or voids; maintain integrity of thermal barrier.
 - 2. Backed Insulation: Use insulation free of ripped backs and edges.
 - 3. Insulations with Vapor Retarder Facing: Install insulation with integral vapor retarder with vapor retarder toward inside of building.
- B. Batt Insulation: Friction fit batt insulation in place; use tape or penetration supports as necessary to assure permanent installation.
 - 1. Taping: Tape joints and tears in integral vapor retarder, including joints between insulation and surrounding construction, to ensure vapor-tight installation.
 - 2. Taping: Tape tears in integral vapor retarder.
 - 3. Penetration Supports: Cut or bend pins in locations accessible to maintenance personnel, to eliminate potential hazards from exposed pin points.
- C. Nailable Surface Roof Insulation: Secure using fasteners recommended by insulation manufacturer for application indicated and capable of resisting wind loads specified for roofing systems applied over nailable surfaced roof board insulation.
- D. Blown-In Insulation: Apply in accordance with manufacturer's instructions to achieve specified thermal resistance and monolithic blanket of uniform density.
 - 1. Assure clips, hangers, supports, sleeves, and other items installed within insulation space are in place before applying insulation.
 - 2. Remove excess, overspray, droppings and debris.
- E. Spray-Foam Insulation: Apply in accordance with manufacturer's instructions to achieve specified thermal resistance and uniform coverage and density.
 - 1. Assure clips, hangers, supports, sleeves, and other items installed within insulation space are in place before applying insulation.
 - 2. Remove excess, overspray, droppings and debris.
- F. Spray-On Insulation: Apply in accordance with manufacturer's instructions to achieve specified thermal resistance, complete adherence to substrate, and monolithic blanket of uniform density.
 - 1. Verify bond requirements and compatibility of substrates; use recommended procedures to minimize unsafe conditions.

2. Clean substrate of dirt, dust, grease, oil, loose particles and materials which could adversely affect bond of insulation.
 3. Assure clips, hangers, supports, sleeves, and other items penetrating insulation are in place before applying insulation.
 4. Protect applied insulation from construction operations and patch as needed to maintain thermal value.
 5. Remove excess, overspray, droppings and debris.
 6. Apply sealer to materials exposed in finished construction and where recommended by manufacturer or required by applicable codes.
- G. Continuous Insulation Installation: Comply with manufacturer recommendations and installation instructions for continuous insulation for use in systems indicated.
- H. Separate Vapor Retarder: Install vapor retarder in accordance with manufacturer's recommendations and installation instructions for complete vapor retarder installation.
1. Tape joints and tears in vapor retarder.
 2. Seal vapor retarder to penetrations.

END OF SECTION

SECTION 07 26 00

BELOW-GRADE VAPOR RETARDER

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide vapor retarder system for below grade and slab-on-grade concrete, including sealing joints and protrusions through vapor retarder and sand bed below vapor retarder.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's literature.

1.3 SITE CONDITIONS

- A. Do not apply vapor retarder during inclement weather or when air temperature is below 40 degrees F.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Fortifiber Corp./Ultra 15.
- B. Raven Industries, Inc./Vapor Block # VB 15 (15 mil Blue).
- C. Stego Industries, Inc./Stego Wrap (15 mil).
- D. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description Includes: Provide vapor retarder system for below grade and slab-on-grade concrete, including sealing joints and protrusions through vapor retarder and sand bed below vapor retarder.
- B. Vapor Retarder: ASTM E1745, Class A vapor retarder consisting of 15 mil polyolefin film.
 - 1. Permeance: Maximum 0.025 perms, ASTM F1249 and E154 tests.
 - 2. Resistance to Puncture: Minimum 2200 grams, ASTM D1709, Method B.
 - 3. Tear Resistance: Minimum 8.74 lbs., ASTM D1004.
 - 4. Tensile Strength: Minimum 35 lbs/in., ASTM E154, Section 9, Method D-882, in both directions.

- C. Joint Sealer: Pressure sensitive tape as recommended by vapor retarder manufacturer and providing comparable permeance to vapor retarder.
- D. Sand Bed: Clean natural sand; free from silt, clay, loam, friable or soluble materials, and organic matter.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Ensure sleeves, curbs and projections that penetrate vapor retarder are properly and rigidly installed.
- B. Ensure substrate is free of projections and irregularities that may be detrimental to proper installation of vapor retarder.

3.2 INSTALLATION

- A. Spread and roll sand to provide smooth, even bed for vapor retarder.
- B. Apply vapor retarder in accordance with manufacturer's recommendations and installation instructions and in accordance with ASTM E1643; comply with most restrictive where conflicts occur.
 - 1. Seal items projecting through vapor retarder with pressure sensitive tape.
- C. Seams: Minimum 12" overlap, sealed with pressure sensitive tape for vapor tight seal.
- D. Lay vapor retarder membrane smooth with no fish-mouths or bunches of material.
- E. Inspect and repair vapor retarder prior to application of concrete slab; tape tears and repair damage.

END OF SECTION

SECTION 07 41 15

MANUFACTURED BATTEN SEAM ROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide factory finished manufactured metal batten seam type roofing including integral metal flashings and sealants, and accessories as required for complete weather-tight installation.
- B. Related Work:
 - 1. Section 07 21 00: Thermal insulation.
 - 2. Section 07 28 00: Building envelope underlayment.
 - 3. Section 07 60 00: Flashing and sheet metal not integral with roofing.

1.2 REFERENCES

- A. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Conference: Convene pre-construction conference one week prior to metal roofing work to coordinate roofing with other trades; require attendance of parties directly affecting metal roofing work.
 - 1. Review installation and coordination required with related work.

1.4 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature for prefabricated components, and recommendations for cleaning and protection.
- B. Shop Drawings: Indicate dimensioning, panel layout, general construction details including closures, flashings, locations of and types of sealants, and anchorage.
- C. Samples: Furnish finished preformed metal roofing and each type of exposed metal flashing.

1.5 QUALITY ASSURANCE

- A. Qualification of Installer: Company with minimum five years successful experience in work of comparable scope.
- B. Mock-Up: Provide 200 square foot mock-up of metal roofing construction at location approved by Architect; approved mock-up may be incorporated into Project.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Provide protective covering on finished flashing materials to protect them through installation.

1.7 WARRANTY

- A. Extended Correction Period: Provide for correcting failure of system to resist damage from anticipated sources including damage from wind and water penetration. Repair system and pay for or replace damaged materials and surfaces.
 - 1. Period: Two years.
- B. Manufacturer's Warranty: Submit manufacturer's warranty including special manufacturer services as required for manufacturer's warranty.
 - 1. Period: 20 years.
 - 2. Manufacturer's warranty shall not detract from requirements of extended correction period nor from Owner's rights under implied and expressed warranties regardless of wording of manufacturer's warranty.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. AEP Span/Snap-on Batten Panels.
- B. **ATAS International/PC Snap-On System. Basis of Design: Color to be confirmed via field review of samples. 1 ½" field lock.**
- C. Metal Sales Manufacturing Corp./Maxi-Batten.
- D. MBCI Inc./Craftsman LB Series.
- E. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description Includes: Provide factory finished manufactured metal snap-on batten seam type roofing including integral metal flashings and sealants, and accessories.
- B. Regulatory Requirements: Comply with California Building Standards Code requirements for metal roofing systems.
 - 1. Cool Roof System: Comply with California Building Standards Code requirements for "Cool Roof" system including three year aged solar reflectance value requirements.
 - a. Label: System to have Cool Roof Rating Council (CRRC) label.

- C. Design Criteria: Design system to provide movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to 100 year seasonal temperature ranges.
 - 1. Design system to accommodate tolerances of structure, provided irregularities do not exceed industry recognized standards and clearances are maintained.
 - 2. Provide for positive drainage of water entering or occurring within preformed metal roofing system.
- D. **Batten Seam Metal Roofing System:** Preformed metal roofing system complete with anchoring assembly and accessory components.
 - 1. Type: Manufacturer's standard batten seam system specified with pans **16" on center**.
 - 2. Sheet Metal: Minimum **22 gage** galvanized steel, minimum G90 galvanized coating, ASTM A924 and A653.
 - 3. Finish: Manufacturer's standard fluoropolymer coil coat finish complying with AAMA 605.2.
 - a. **Color: Hemlock Green or Patina Green**
- E. Sealants and Gaskets: Manufacturer's standard type suitable for use in conjunction with installation of metal roofing.
 - 1. Non-staining; non-corrosive; non-shrinking and non-sagging; ultra-violet and ozone resistant for exterior applications.
 - 2. Color of exposed sealants and gaskets to match roofing.
- F. Fasteners: Manufacturer's standard hot dip galvanized fasteners with not less than G90 galvanized coating.
 - 1. Finish exposed fasteners to match roofing.
- G. Underlayment: Specified in Section 07 28 00 – Building Envelope Underlayment.

2.3 FABRICATION

- A. Internal and External Corners: Same materials, material thickness and finish as roofing, profile to suit system, brake formed, shop cut and factory mitered to required angles.
- B. Mitered internal corners shall be backed with minimum 22 gage galvanized steel sheet stock to maintain continuity of profile.
- C. Expansion Joints: Provide concealed metal expansion control throughout roofing system.

- D. Sheet Metal Gutters, Flashings, Closures and Other Components: Brake formed to required profiles; conform to SMACNA Manual.
 - 1. Conform to requirements specified in Section 07 60 00 - Flashing and Sheet Metal
- E. Provide for positive drainage to exterior, any water entering or occurring within metal roofing systems.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify substrate is free of elements that could be harmful to system.
- B. Beginning of work signifies acceptance of conditions.
- C. Take special care not to damage underlayment beyond that required to secure system to structure.

3.2 INSTALLATION

- A. Install manufactured metal batten seam roofing in accordance with manufacturer's recommendations, installation instructions, and approved shop drawings.
- B. Install metal flashing and sheet metal in accordance with SMACNA Architectural Sheet Metal Manual.
 - 1. Comply with installation requirements specified in Section 07 60 00 - Flashing and Sheet Metal.
- C. Exercise care when cutting materials on site, to ensure cuttings do not remain on finished surfaces.
- D. Protect metal surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow protective coating to dry prior to installing members.
- E. Permanently fasten roofing system to structural supports, properly aligned, leveled and plumb.
 - 1. Maximum 1/16" offset from true alignment between adjacent members butting or in line.
 - 2. Maximum 1/4" variation from plane or location indicated on Drawings.
- F. Locate end laps over supports; end lap panels minimum 2"; ensure sidelaps are over firm bearing.
- G. Provide expansion joints at regular basis, concealed within system.
- H. Use concealed fasteners except where specifically approved by Architect.

- I. Install sealants and gaskets where required to prevent direct weather penetration.
- J. Completed installation shall be free of rattles, noise due to thermal and air movement, and wind whistles.
- K. Remove protective coating when no longer required to protect roofing and flashing from construction.

END OF SECTION

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide metal flashings and sheet metal including accessories as required for complete weathertight installation.
 - 1. Flashing and sheet metal includes copings, fascias, scuppers, gutters, downspouts, rainwater leaders, reglets, and similar fabricated components as applicable to Project.
 - 2. Provide concealed sealants used in conjunction with installation of metal flashing and sheet metal.
 - 3. Provide miscellaneous sheet metal flashing and reglets not provided by other trades or suppliers.
 - a. Where reglets are to be installed in conjunction with other work, provide in adequate time for installation.
 - b. Where reglets are to be surface applied, provide continuous gasket between reglet and surface.
- B. Related Sections:
 - 1. Section 06 10 50: Miscellaneous rough carpentry.
 - 2. Section 07 28 00: Concealed flashing at weather barrier/underlayment.
 - 3. Section 07 41 10: Flashing and sheet metal integral with metal roofing.
 - 4. Section 07 95 00: Expansion joint cover assemblies at roofing.

1.2 REFERENCES

- A. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual.

1.3 SUBMITTALS

- A. Product Data: Furnish literature for manufactured products.
- B. Shop Drawings: Clearly indicate dimensioning, layout, general construction details including closures, flashings, locations and types of sealants, anchorages, and method of anchorage.
- C. Samples: Furnish samples of typical metal flashing fabrication indicating standard soldered joints and edge conditions.

1.4 QUALITY ASSURANCE

A. Sustainability Requirements:

- 1) two years' successful experience with CAL/Green requirements.
2. CALGreen Requirements: Refer to Section 01 35 15 – CALGreen Environmental Requirements and comply with applicable CALGreen Checklist indicating requirements applicable to Project.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Provide strippable film protective covering on shop finished flashing materials to protect materials through shipping, fabrication and installation.

1.6 WARRANTY

- A. Extended Correction Period: Provide for correcting failure of system to resist damage from anticipated sources including damage from wind and water penetration. Repair system and pay for or replace damaged materials and surfaces.
1. Period: Two years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide flashing and sheet metal including reglets and accessories as required for complete weathertight installation.
- B. Design Criteria: Allow for movement of components without causing buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to 100-year seasonal temperature ranges.
- C. Flashing and Sheet Metal:
1. Shop Finished Galvanized Steel Flashing and Sheet Metal: ASTM A924 and A653 G90 galvanized steel; minimum 24-gage; with factory applied fluoropolymer coating based on Kynar 500 or Hylar 5000.
 - a. Manufacturers:
 - 1) PAC-Clad: Premium Color (**Basis of Design**)
 - 2) Ryerson Building Products (800.328.7800)/ColorKlad.
 - 3) Metal Sales Manuf. Corp.(800.406.7387)/PVDF (Kynar 500).
 - 4) K&M Sheet Metal (888.567.7778)/Kynar Steel.
 - 5) Substitutions: Refer to Section 01 25 00.
 - b. Location (Exposed): Where indicated, if not otherwise indicated, provide where flashing will be exposed to view from exterior of building, and where exposed to view from spaces within building.

- c. Colors:
 - d. Touch-up Paint for Prefinished Sheet Metal: Type recommended by fluoropolymer manufacturer for field touch-up.
 - 2. Stainless Steel Flashing and Sheet Metal: Stainless steel, ASTM A666, Type 304, soft annealed, 2B finish, minimum 26-gage.
 - a. Location (Exposed): Where indicated, if not otherwise indicated, provide where flashing will be exposed to view from exterior of building, and where exposed to view from spaces within building.
 - 3. Lead Flashing: ASTM B749, type L51121, copper-bearing sheet lead, minimum four pound per square foot (1/16" thick) lead with 6% to 7% antimony content.
 - 4. Accessories: Provide strainers, outlet tubes, screens, baffles, hangers and gutter ends as required for a complete system and complying with SMACNA Manual.
 - 5. Provide heavier gage metal where recommended by SMACNA Manual for size of component.
- D. Manufactured Reglets: Snap-on type, for two-piece flashing; metal to match flashing and sheet metal.
- 1. Manufacturers:
 - a. Fry Reglet Corp./Springlok System.
 - b. W.P. Hickman Co./The Leading-Edge Drive Lock System.
 - c. Substitutions: Refer to Section 01 25 00.
- E. Solder and Fasteners: As recommended by SMACNA and complying with applicable codes and regulations; hot dipped galvanized minimum coating comparable to G90.
- F. Concealed Sealant: Butyl type for use in conjunction with sheet metal; non-staining; non-corrosive; non-shrinking and non-sagging; ultra-violet and ozone resistant for exterior concealed applications.
- G. Bituminous Paint: Acid and alkali resistant type; black color; asbestos free.
- H. Plastic Cement: Cutback asphaltic type; asbestos free.
- I. Sealing Compound: Type recommended by roofing manufacturer; asbestos free.
- J. Gaskets: Type suitable for use in conjunction with sheet metal; non-staining, non-corrosive, non-shrinking, non-sagging, ultra-violet resistant, and ozone resistant; for exterior concealed applications.
- 1. Manufacturers:
 - a. Emseal USA, Inc./Emseal MST Multi-Use Sealant Tape.
 - b. Substitutions: Refer to Section 01 25 00.

2.2 FABRICATION

- A. Fabricate sheet metal in accordance with SMACNA Architectural Sheet Metal Manual.
- B. Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
 - 1. Fabricate corners and intersections in shop with solder joints; watertight fabrication.
- C. Form sections in maximum 10'-0" lengths; make allowance for expansion at joints.
- D. Hem exposed edges on underside 1/2".
- E. Back-paint flashings with heavy bodied bituminous paint where in contact with cementitious materials or dissimilar metals.
- F. Form pitch pans watertight, with minimum 4" upstand and 4" flanges; form pans minimum 6" wider than item passing through roof membrane.
- G. Form umbrella flashings with minimum 2" overhang, to shed water away from pitch pans.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install metal flashing and sheet metal in accordance with SMACNA Architectural Sheet Metal Manual.
 - 1. Install tight in place, with corners square, surfaces true and straight in planes, and lines accurate to profiles as indicated on Drawings.
 - 2. Lap joints in direction of water flow.
 - 3. Hold downspouts in position, clear of wall, by hangers spaced not more than 10'-0" on center; securely fasten hangers to wall without exposed damage to wall surface.
- B. Exercise care when cutting materials on site, to ensure cuttings do not remain on finished surfaces.
- C. Provide expansion joints concealed within system.
- D. Use concealed fasteners, continuous cleat type, except where specifically approved by Architect.
 - 1. Exposed fasteners may be used, where clearly indicated on shop drawings and approved by Architect, at areas not exposed at exterior walls nor in sight of interior spaces.
- E. Apply sealing compound at junction of metal flashing and felt flashing.

- F. Lock seams and end joints; fit flashing tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- G. Counter-flash mechanical and electrical items projecting through roof membrane.
- H. Install sealants where required to prevent direct weather penetration.
 - 1. Install continuous gasket behind surface applied reglets.
- I. Completed installation shall be free of rattles, noise due to thermal and air movement, and wind whistles.
- J. Install pitch pans and fill with plastic cement.
- K. Install umbrella flashing with draw band collars with sheet metal sealant between penetrating item and flashing; use wood blocking at angle type penetrations and cover blocking with sealant.

3.2 CLEANING

- A. Remove protective coating from shop finished sheet metal when no longer required to protect roofing and flashing from construction.
- B. Touch-up scratched and damaged finish to match new; remove and replace sheet metal units that cannot be repaired to look identical to adjacent sheet metal when viewed from 15'-0" away.

END OF SECTION

SECTION 07 90 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide joint sealants, for interior and exterior joints not specified elsewhere, with backing rods and accessories as required for complete installation.
 - 1. Joint sealants include joint sealers and calking as indicated.
- B. Related Sections:
 - 1. Section 07 60 00: Flashing and sheet metal concealed sealants.
 - 2. Section 09 21 00: Sealants used for acoustical treatment at gypsum board.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's descriptive literature.
- B. Samples: Furnish samples of each type of exposed joint sealer in required colors.
- C. Certifications:
 - 1. Furnish manufacturer's certification joint sealers comply with Contract Documents and are suitable for Project applications.
 - 2. Furnish certification indicating installers are trained in proper use of specified products, qualified, and familiar with proper installation techniques.

1.3 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for adhesives, sealants, and caulks.
 - 1. Provide joint sealants as required by applicable codes and regulations to fill joints and openings in building envelope separating conditioned space from unconditioned space.
- B. Installer Qualifications: Firm with minimum five years successful experience on projects of similar type and size, using specified products.
- C. Installers shall be familiar with proper application procedures to ensure maximum joint sealer expansion and contraction capabilities.
- D. Mock-Up: Provide exterior joint sealers where required for mock-ups of other systems.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, cure time, and mixing instructions.

1.5 SITE CONDITIONS

- A. Do not proceed with installation of joint sealers under unfavorable weather conditions.
- B. Install elastomeric sealants when temperature is in lower third of temperature range recommended by manufacturer.

1.6 WARRANTY

- A. Extended Correction Period: Extend correction period to two years.
 - 1. Repair or replace joint sealers which fail to perform as intended, because of leaking, crumbling, hardening, shrinkage, bleeding, sagging, staining, loss of adhesion, and loss of cohesion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide joint sealants with backing rods and accessories.
- B. Performance Requirements:
 - 1. Select materials for compatibility with joint surfaces and indicated exposures.
 - 2. Where not indicated, select modulus of elasticity and hardness or grade recommended by manufacturer for each application indicated.
 - 3. Comply with applicable limitations on volatile organic compound (VOC) emissions.
- C. Regulatory Requirements: Comply with applicable regulatory requirements regarding limitations on volatile organic compound (VOC) emissions limitations.

D. Elastomeric Sealants:

1. Single Component Low Modulus Silicone Sealant: ASTM C920 Type S, Class 25, Grade NS; minimum 50% expansion and compaction capability.
 - a. Provide at exterior locations not exposed to traffic.
 - b. Manufacturers:
 - 1) GE (Momentive Performance Materials)/Silpruf, Silglaz or GESIL.
 - 2) Dow Corning Corp./790 or 795.
 - 3) Pecora Corp./864 Architectural Silicone.
 - 4) Tremco/Spectrem 3.
 - 5) Substitutions: Refer to Section 01 25 00.
2. Multi-Component Polyurethane Sealant: ASTM C920, Type M, Grade NS, Class 25, non-sag; minimum 25% expansion and compaction capability.
 - a. Provide at exterior locations not exposed to traffic.
 - b. Manufacturers:
 - 1) Pecora Corp./Dynatrol II.
 - 2) Tremco/Dymeric 240.
 - 3) BASF/MasterSEal NP 2.
 - 4) Substitutions: Refer to Section 01 25 00.
3. Single Component Low Modulus Sealant: ASTM C920 Type S, Class 35, Grade NS; minimum 50% expansion and compaction capability.
 - a. Provide at exterior locations not exposed to traffic.
 - b. Manufacturers:
 - 1) Fortifiber Building Systems Group/Moistop Sealant.
 - 2) Sika Group/SikaFlex 1A+.
 - 3) Substitutions: Refer to Section 01 25 00.
4. Multi-Component Polyurethane Sealant: ASTM C920, Type M, Grade P, Class 25, self-leveling; minimum 25% expansion and compaction capability.
 - a. Provide at traffic bearing locations.
 - b. Manufacturers:
 - 1) Pecora Corp./Urexpan NR-200, or Dynatrol II-SG.
 - 2) Tremco/THC 900-901, or Vulkem 445 SSL.
 - 3) BASF/MasterSeal SL 2
 - 4) Substitutions: Refer to Section 01 25 00.

5. Mildew-Resistant Silicone Rubber Sealant: ASTM C920, Type S, Grade NS, Class 25, compounded with fungicide, specifically for mildew resistance and recommended for interior joints in wet areas.
 - a. Provide at interior joints in wet areas.
 - b. Manufacturers:
 - 1) GE (Momentive Performance Materials)/SCS 1702 Sanitary Sealant.
 - 2) Dow Corning Corp./786 Bathtub Caulk.
 - 3) Pecora Corp./898 Sanitary Mildew Resistant Sealant.
 - 4) Tremco/Tremsil 200.
 - 5) Substitutions: Refer to Section 01 25 00.

E. Non-Elastomeric Sealants:

1. Acrylic-Emulsion Sealant: ASTM C834 acrylic or latex-rubber-modified acrylic sealant, permanently flexible, non-staining and non-bleeding; recommended for general interior exposure; compatible with paints specified in Section 09 90 00.
 - a. Provide at general interior applications.
 - b. Manufacturers:
 - 1) Pecora Corp./AC-20.
 - 2) Tremco/Tremflex 834.
 - 3) Substitutions: Refer to Section 01 25 00.
2. Air Seals: Provide non-staining and non-bleeding sealers, calks, or foams appropriate to specific applications for filling openings between conditioned and unconditioned spaces.
 - a. Type: As recommended by manufacturer for each specific application; compatible with adjacent materials.
 - b. Manufacturers:
 - 1) Dow/Great Stuff.
 - 2) Owens Corning/EnergyComplete Air Sealant.
 - 3) Hilti/Foam Filler CF 812.
 - 4) Substitutions: Refer to Section 01 25 00.
 - c. Pest Control Mesh: Openings subject to pest infiltration to have 304 stainless steel wool, material stuffed in joint before application of air seals using methods to ensure blocking of gap from pests.
 - d. Exception: Annular spaces around pipes, electric cables, conduits and other openings in exterior walls shall be protected against passage of rodents by closing with cementitious grout.

- 1) Cementitious Grout: ASTM C1107 non-shrink, non-metallic, pre-mixed, factory-packaged, non-staining, non-corrosive; type specifically recommended by manufacturer as applicable to job condition.

F. Miscellaneous Materials:

1. Primers/Sealers: Non-staining types recommended by joint sealer manufacturer for joint surfaces to be primed or sealed.
2. Joint Cleaners: Non-corrosive types recommended by joint sealer manufacturer; compatible with joint forming materials.
3. Bond Breaker Tape: Polyethylene tape as recommended by joint sealer manufacturer where bond to substrate or joint filler must be avoided for proper performance of joint sealer.
4. Sealant Backer Rod: Compressible polyethylene foam rod or other flexible, permanent, durable non-absorptive material as recommended by joint sealer manufacturer for compatibility with joint sealer.
 - a. Oversize backer rod minimum 30% to 50% of joint opening.

G. Colors: As indicated, as selected by Architect from manufacturer's full range of colors where not indicated.

1. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare joint surfaces in accordance with ASTM C1193 and as recommended by joint sealer manufacturer.
- B. Clean joint surfaces immediately before installation of joint sealer; remove dirt, insecure materials, moisture and other substances which could interfere with bond of joint sealer.
- C. Prime or seal joint surfaces where recommended by joint sealer manufacturer; do not allow primer/sealer to spill or migrate onto adjoining surfaces.
- D. Ensure protective coatings on surfaces in contact with joint sealers have been completely stripped.

3.2 INSTALLATION

- A. Comply with manufacturer's printed instructions and ASTM C1193, except where more stringent requirements are shown or specified.

- B. Pest Control: Install stainless steel wool prior to application of backer rods and bond breakers at air seal and as required to ensure complete pest blockage at joints where pest intrusion is a potential.
- C. Set sealant backer rods at proper depth or position in joint to coordinate with other work, including installation of bond breakers and sealant; do not leave voids or gaps between ends of backer rods.
 - 1. Do not stretch, twist, puncture or tear backer rods.
- D. Install bond breaker tape as required to avoid three-sided bond of sealant to substrate and where required by manufacturer's recommendations to ensure joint sealers will perform properly.
- E. Size materials to achieve required width/depth ratios.
- F. Employ installation techniques that will ensure joint sealers are deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of bond surfaces equally on opposite sides.
- G. Joint Configuration: Fill sealant joint to a slightly concave surface, slightly below adjoining surfaces, unless otherwise indicated.
- H. Where horizontal joints are between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture or dirt.
- I. Install joint sealers to depths recommended by joint sealer manufacturer but within the following general limitations, measured at center (thin) section of bead.
 - 1. Horizontal Joints: 75% width with minimum depth of 3/8".
 - 2. Elastomeric Joints: 50% width with minimum depth of 1/4".
 - 3. Non-Elastomeric Joints: 75% to 125% of joint width.
- J. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into voids of adjoining surfaces.
 - 1. Clean adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
- K. Cure joint sealers in compliance with manufacturer's instructions and recommendations to obtain high early bond strength, internal cohesive strength and surface durability.
- L. Maintain finished joints free of embedded matter, ridges and sags.

END OF SECTION

SECTION 08 11 10

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide full flush steel (hollow metal) doors and pressed steel frames, including anchors and silencers.
 - 1. Pressed steel frames
- B. Related Sections:
 - 1. Section 08 11 25: Interior aluminum doors and frames.
 - 2. Section 08 71 00: Door hardware.
 - 3. Section 08 80 00: Glazing.

1.2 REFERENCES

- A. Steel Door Institute (SDI): SDI-100 (ANSI/SDI A250.8) - Recommended Specifications - Standard Steel Doors and Frames.
- B. National Association of Architectural Metal Manuf. (NAAMM): Hollow Metal Manual.
- C. Underwriters Laboratories: Standards as applicable to fire rated doors and frames.
 - 1. Materials tested, labeled and inspected by Warnock Hersey International are acceptable upon approval of authorities.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate hardware installation with Section 08 71 00 – Door Hardware.
 - 2. Coordinate glass installation with Section 08 80 00 - Glazing.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturers' literature.
- B. Shop Drawings: Indicate general construction, configuration, jointing methods, reinforcement, anchorage methods, hardware locations, and locations of cut-outs.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Amweld Building Products Inc.
- B. Ceco Door Division Assa Abloy Door Group.
- C. Curries Division Assa Abloy Door Group.
- D. Door Components, Inc.
- E. Republic Doors and Frames.
- F. Krieger Steel Products Co.
- G. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide full flush steel (hollow metal) doors and pressed steel frames, including anchors and silencers.
- B. Doors: Hollow metal flush steel door, 1-3/4" thick.
 - 1. Typical: Full flush with steel channel or welded edge; close top with flush end closer treatment, bottom optional flush or recessed channel; steel stiffened core, insulated at exterior doors; continuous welded seam.
 - 2. Interior Doors: Minimum 0.042" (18-gage).
 - 3. Exterior Doors: Minimum 0.053" (16-gage).
 - 4. Glazed and Louver Doors: Provide systems as indicated on Drawings.
- C. Frames:
 - 1. Exterior Frames: Welded (pre-assembled) type.
 - 2. Interior Frames: Knockdown (field-assembled) type; provide 3/8" back bend return on frames at gypsum board.
 - 3. Gage: Minimum 0.053" (16-gage) interior frames, 0.067" (14-gage) exterior frames.
 - 4. Door Silencers: Manufacturer's standard resilient type; removable for replacement.
 - 5. Mortar Guard Boxes: Minimum 0.026" (22-gage) mortar guard boxes welded in place; provide where frames may be grouted.

- D. Glazing Stops: Full flush type with glass centered in opening, unsecured side integral with unit, secured side fastened with flush, countersunk Allen type fasteners; minimum 0.053" (16-gage).
- E. Fire Rated Units: Construct in accordance with requirements for fire rating, NFPA 252 or UL 10C, and NFPA 80.
 - 1. Labels: Place fire rating labels where visible when doors and frames are in installed, opened position.
 - 2. Fire Ratings: Refer to Drawings for fire rating requirements.
 - 3. Temperature Rise Rating: Provide doors with maximum 450°F Temperature Rise Rating in 30-minute fire exposure period at doors into exit enclosures and where otherwise required by applicable codes.
- F. Door Louvers:
 - 1. Interior Doors: Stationary, sight-proof hood or Y type blades of 24-gage steel inserted into door panels full door thickness; no exposed trim.
 - 2. Exterior Doors: Weatherproof Z-shaped blades with U-shaped frames; 1-3/8" thick; blades 1-1/2" on center; 0.053" (16 gage) welded construction.
 - a. Provide removable bird screens on interior faces, 1/2" by 1/2" bronze wire mesh.

2.3 FABRICATION

- A. Conform to requirements of SDI (ANSI A250 Series) or NAAMM.
- B. Reinforce and prepare doors and frames to receive hardware.
 - 1. Refer to Section 08 71 00 for hardware requirements.
- C. Frames:
 - 1. Welded Frames: Accurately form and cut mitered corners of welded type frames; continuously weld on inside surfaces (fully welded); grind welded joints to smooth uniform finish.
 - 2. Knocked Down Frames: Accurately form and miter interlocking joints of knocked down frames to maintain hairline alignment of parts when field assembled.
 - 3. Head Reinforcement: Reinforce frames wider than 4'-0" with minimum 0.093" (12 gage) formed steel channels welded in place, flush with top of frames.
 - 4. Doors at Glazed Panels: Reinforce jambs and heads of frames for doors which occur adjacent to glazed sidelights and partitions.

- D. Door Silencers:
 - 1. Place three single bumpers on single door frames; space equally along strike jambs.
 - 2. Place two single bumpers on double door frames; place on frame heads.
 - 3. Place three single bumpers for each door on door frames with removable mullions, spaced equally along strike jambs, and in addition place two single bumpers on frame heads to cushion door when mullion is removed.
- E. Provide jamb anchors per SDI-100 (ANSI/SDI 250.8) and NAAMM; weld floor jamb anchors in place.
- F. Provide double doors tested and approved without astragals.
 - 1. Provide astragals for double doors when required to meet UL requirements for Class A, 3-hour rated doors only.
- G. Edge Clearances:
 - 1. Between Doors and Frames: Maximum 1/8" at head and jambs.
 - 2. Door Sills (No Threshold): Maximum 1/2".
 - 3. Door Sills (Threshold): Maximum 3/8" above finished floor.
 - 4. Between Edges of Pairs of Doors: Maximum 1/8".
 - 5. Fire Rated Doors: As required for fire ratings.
- H. Finish: Comply with requirements of Section 09 90 00 – Painting and Coating for primer including application and compatibility with specified finishes.
 - 1. Interior Units: Prime paint.
 - 2. Exterior Exposed Units: Apply minimum A60 non-spangle galvanized coating, ASTM A924 and A653.
 - a. Surface treat after galvanizing to remove oils and prepare for painting and apply one coat of primer; comply with requirements in Section 09 90 00.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install doors and frames in accordance with SDI-100 (ANSI/SDI A250.8) and ANSI/SDI A250.11 or NAAMM "Hollow Metal Manual" and with manufacturer's recommendations and installation instructions.
 - 1. Install fire rated units in conformance with fire label requirements and NFPA 80.
- B. Install doors and frames plumb and square within 1/16", and with maximum diagonal distortion of 1/32".

- C. Remove and replace doors and frames damaged during delivery, storage, installation and construction.
 - 1. Paste filler repair shall not be permitted.
- D. After installation, touch-up scratched paint surfaces.

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide access doors set in finished surfaces.
 - 1. Provide access doors and panels as required for access to controls and valves behind finished surfaces.
 - 2. Coordinate with various trades for controls and valves which may be concealed.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature.
- B. Shop Drawings: Indicate locations of access doors required but not indicated on Architectural Drawings.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Milcor Inc.
- B. Karp Associates, Inc.
- C. J.L. Industries.
- D. Nystrom Building Products.
- E. Elmdor Manufacturing Co.
- F. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide access doors and panels set in finished surfaces.
- B. Access Doors and Panels: Provide access door and panel assemblies consisting of an integral unit with flush metal doors and panels, complete and ready for installation.
 - 1. Wall Units: Match Milcor/Style M flush panel style; stainless steel.
 - 2. Units Mounted in Plaster: Match Milcor/Style K, flush panel style.
 - 3. Gypsum Board Ceilings: Match Milcor/Style M flush panel

- C. Frames: Fabricate from not less than 16-gage stainless steel.
- D. Doors: Flush panel type, fabricate from not less than 14-gage stainless steel.
- E. Hinges: Provide continuous piano type hinge.
- F. Locking Devices: Provide flush, key-operated cylinder lock for each access door; provide two keys per lock and key locks alike, coordinate with owner's maintenance keying standards.
- G. Finish:

- 1. Stainless Steel: provide Type 304 corrosion resistant nonmagnetic stainless-steel access doors and frames.**

2.3 FABRICATION

- A. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary slightly from sizes shown or scheduled.
- B. Fabricate units of continuous welded steel construction; grind welds smooth and flush with adjacent surfaces.
- C. Provide attachment devices and fasteners of type required for specific job conditions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which access doors are to be installed.
 - 1. Do not proceed with work until unsatisfactory conditions are corrected; installation signifies acceptance of conditions.
- B. Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment; coordinate installation with work of other trades.

3.2 INSTALLATION

- A. Comply with manufacturer's installation instructions for access doors.
 - 1. Install fire rated access doors in accordance applicable code requirements and with requirements of NFPA 80.
- B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- C. Adjust hardware and doors after installation for proper operation.

3.3 PROTECTION

- A. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes:

- 1. Mechanical door hardware for:

- a. Swinging doors.

- B. Exclusions: Unless specifically listed in hardware sets, hardware is not specified in this section for:

- 1. Windows
 - 2. Cabinets (casework), including locks in cabinets
 - 3. Signage
 - 4. Toilet accessories
 - 5. Overhead doors
 - 6. Installation.
 - 7. Rough hardware.
 - 8. Conduit, junction boxes & wiring.
 - 9. Folding partitions, except cylinders where detailed.
 - 10. Sliding aluminum doors, except cylinders where detailed.
 - 11. Access doors and panels, except cylinders where detailed.

C. Related Sections:

- 1. Division 01 Section "Alternates" for alternates affecting this section.
 - 2. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.

1.3 REFERENCES

A. UL - Underwriters Laboratories

- 1. UL 10B - Fire Test of Door Assemblies
 - 2. UL 10C - Positive Pressure Test of Fire Door Assemblies
 - 3. UL 1784 - Air Leakage Tests of Door Assemblies
 - 4. UL 305 - Panic Hardware

- B. ANSI - American National Standards Institute
 - 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
- C. California Code of Regulations
 - 1. Title 24: California Building Standards Code

1.4 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
- B. Action Submittals:
 - 1. Product Data: Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 - 3. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.
 - i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.
 - 4. Key Schedule:

- a. Initiate and conduct meeting(s) with Owner representatives and hardware supplier to determine system keyway(s), keybow styles, structure, stamping, degree of physical security and degree of geographic exclusivity. Furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner.
 - b. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
 - c. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - d. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - e. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - f. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.
- C. Informational Submittals:
1. Qualification Data: For Supplier and Installer.
 2. Certificates of Compliance:
 3. Warranty: Special warranty specified in this Section.
- D. Closeout Submittals:
1. Operations and Maintenance Data : Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Final approved hardware schedule, edited to reflect conditions as-installed.
 - e. Final keying schedule
 - f. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.5 QUALITY ASSURANCE

- A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified herein.

1. Where products indicate “acceptable manufacturers” or “acceptable manufacturers and products”, provide product from specified manufacturers, subject to compliance with specified requirements and “Single Source Responsibility” requirements stated herein.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project.
 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- D. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- E. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- F. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
- G. Means of Egress Doors: Latches do not require more than 5 lbs (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.
- H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in “REFERENCES” article, herein.
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbs (22.2 N).
 2. Maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbs (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbs (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: The minimum opening force allowable by the appropriate administrative authority, not to exceed 15 lbs (66.7N).
 3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 4. Adjust closer so that the time required to move the door from the 90 degree position to 12 degrees from the latch is 5 seconds minimum.

- I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Review required testing, inspecting, and certifying procedures.
- J. Coordination Conferences:
 - 1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - a. Attendees: Door hardware supplier, door hardware installer, Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 - 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 - 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 - 2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
 - 1. Promptly replace products damaged during shipping.
 - 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 - 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.7 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.

- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Direct shipments not permitted, unless approved by Contractor.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 30 years.
 - b. Locksets:
 - 1) Mechanical: 10 years
 - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.9 MAINTENANCE

- A. Maintenance Tools:
 - 1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturer" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article, herein.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

- D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.2 MATERIALS

A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
 2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
 3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
 4. Install hardware with fasteners provided by hardware manufacturer.
- B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.
1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

2.3 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Ives 5BB series
2. Acceptable Manufacturers and Products: Hager BB series, Stanley F179

B. Requirements:

1. Provide five-knuckle ball bearing hinges conforming to ANSI/BHMA A156.1.
2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
3. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
4. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
6. Where new hinges are specified for existing doors or existing frames, provide new hinges of identical size to hinge preparation present in existing door or existing frame.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
8. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors, and 5 inches (127 mm) at 2 inches (51 mm) or thicker doors. Adjust hinge width as required for door, frame, and wall conditions to allow proper degree of opening.
9. Doors 36 inches (914 mm) wide or less furnish hinges 4-1/2 inches (114 mm) high; doors greater than 36 inches (914 mm) wide furnish hinges 5 inches (127 mm) high, heavy weight or standard weight as specified.
10. Provide spring hinges where specified. Provide two spring hinges and one bearing hinge per door leaf for doors 90 inches (2286 mm) or less in height. Provide one additional bearing hinge for each 30 inches (762 mm) of additional door height.

2.4 CYLINDER LOCKS – GRADE 2

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage ALX Series
2. Acceptable Manufacturers and Products: Best 73KC series, Sargent 7-Line

B. Requirements

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 2, and UL Listed for 3-hour fire doors with a minimum cycle life of 1 million.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide 3/4" latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide a minimum of 5 points of lever engagement between the cassette spindle and lever shank to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Plug-n-Play – Provide modular lockset allowing lock functions to be created for 7 typical functions by inserting/installing parts into the exterior of a fully assembled chassis
9. Reconfigurable Chassis - Provide modular lockset that allows the function to be reconfigured by removing external components from the chassis
10. Lever Trim: Solid cast levers and wrought roses on both sides.

- a. Lever Design: Rhodes

2.5 CYLINDERS

A. Manufacturers:

- 1. Scheduled Manufacturer: Schlage
- 2. Acceptable Manufacturers: Best, Medeco

B. Requirements:

- 1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article, herein.
- 2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.

- a. Conventional Open: cylinder with interchangeable core with open keyway

- 3. Nickel silver bottom pins.

- 4. Replaceable Construction Cores.

- a. Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.

- 1) 3 construction control keys
- 2) 12 construction change (day) keys.

- b. Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2.6 KEYING

- A. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

- B. Confirm Keying with Owner

C. Requirements:

- 1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.

- a. Master Keying system as directed by the Owner.

- 2. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.

- 3. Provide keys with the following features:

- a. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)

- 4. Identification:

- a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
 - d. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
5. Quantity: Furnish in the following quantities.
- a. Change (Day) Keys: 3 per cylinder/core.
 - b. Permanent Control Keys: 3.
 - c. Master Keys: 6.

2.7 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer: Telkee
2. Acceptable Manufacturers: HPC, Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.8 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4040XP series.
2. Acceptable Manufacturers and Products: Sargent 281 series.

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.

4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.9 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

1. Provide push plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick and beveled 4 edges. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
2. Provide push bars of solid bar stock, diameter and length as scheduled. Provide push bars of sufficient length to span from center to center of each stile. Where required, mount back to back with pull.
3. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
4. Provide flush pulls as scheduled. Where required, provide back-to-back mounted model.
5. Provide pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
6. Provide pull plates 4 inches (102 mm) wide by 16 inches (406 mm) high by 0.050 inch (1 mm) thick, beveled 4 edges, and prepped for pull. Where width of door stile prevents use of 4 inches (102 mm) wide plate, adjust width to fit.
7. Provide wire pulls of solid bar stock, diameter and length as scheduled.
8. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.10 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes of plates:
 - a. Kick Plates: 10 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - b. Mop Plates: 4 inches (102 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs
 - c. Armor Plates: 36 inches (914 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.11 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.12 THRESHOLDS, SEALS, DOOR SWEEPS, AND GASKETING

A. Manufacturers:

1. Scheduled Manufacturer: Zero International
2. Acceptable Manufacturers: National Guard, Pemko

B. Requirements:

1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
2. Size of thresholds:
 - a. Saddle Thresholds: 1/2 inch (13 mm) high by jamb width by door width
 - b. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width

3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.13 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Rockwood, Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.14 FINISHES

A. Finish: BHMA 626/652 (US26D); except:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Continuous Hinges: BHMA 630 (US32D)
3. Continuous Hinges: BHMA 628 (US28)
4. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
5. Protection Plates: BHMA 630 (US32D)
6. Overhead Stops and Holders: BHMA 630 (US32D)
7. Door Closers: Powder Coat to Match
8. Wall Stops: BHMA 630 (US32D)
9. Latch Protectors: BHMA 630 (US32D)
10. Weatherstripping: Clear Anodized Aluminum
11. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Where on-site modification of doors and frames is required:

1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
2. Field modify and prepare existing door and frame for new hardware being installed.
3. When modifications are exposed to view, use concealed fasteners, when possible.
4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.
 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 1. Replace construction cores with permanent cores as indicated in keying section.

- I. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- J. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
- K. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- L. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- M. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- N. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- O. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- P. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.
- B. Do not order material until submittal has been reviewed, stamped, and signed by Architect's door hardware consultant.
- C. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- D. Hardware Sets:

135032 OPT0430795 Version 1

Legend:

 Link to catalog cut sheet

 Electrified Opening

Hardware Group No. 01 - RESTROOM MULTI STALL

For use on Door #(s):

A101	A102	A107	A108	A110-A	A111-A
B201	B202	B206	B207		
Provide each SGL door(s) with the following:					
QT	DESCRIPTION		CATALOG NUMBER	FINIS	MFR
Y				H	
3	EA	HINGE	5BB1 4.5 X 4.5	 652	IVE
1	EA	CLASSROOM LOCK	ALX70T RHO	 626	SCH
1	EA	FSIC CORE	23-030	 626	SCH
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ	 689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	 630	IVE
1	EA	WALL STOP	WS406/407CCV	 626	IVE
			REQUIRES BACKING IN WALL		
1	EA	GASKETING	188SBK PSA	 BK	ZER
1	EA	DOOR SWEEP	39A	 A	ZER
1	EA	THRESHOLD	545A OR AS DETAILED	 A	ZER

Hardware Group No. 02 - PRIVACY I/S WS

For use on Door #(s):

**OC FAIR AND EVENT CENTER
CAMPGROUND –
SHOWER & RESTROOM BUILDING**

7/15/25

DSA SUBMITTAL

A103	A104	A106	B203	B205			
Provide each SGL door(s) with the following:							
QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR	
Y					H		
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE	
1	EA	PRIVACY LOCK	ALX40 TLR		626	SCH	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN	
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE	
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS		630	IVE	
1	EA	WALL STOP	WS406/407CCV REQUIRES BACKING IN WALL		626	IVE	
1	EA	GASKETING	188SBK PSA		BK	ZER	
1	EA	DOOR SWEEP	39A		A	ZER	
1	EA	THRESHOLD	545A OR AS DETAILED		A	ZER	

Hardware Group No. 02A - PRIVACY I/S WS SHOWER

For use on Door #(s):

A109

Provide each SGL door(s) with the following:

QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR	
Y					H		
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE	
1	EA	PRIVACY LOCK	ALX40 TLR		626	SCH	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN	
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE	
1	EA	WALL STOP	WS406/407CCV REQUIRES BACKING IN WALL		626	IVE	
1	EA	GASKETING	188SBK PSA		BK	ZER	
1	EA	DOOR SWEEP	39A		A	ZER	
1	EA	THRESHOLD	545A OR AS DETAILED		A	ZER	

Hardware Group No. 03 - STOREROOM I/S WS

For use on Door #(s):

A105-A	A105-B	A112	A113	B204-A	B204-B		
Provide each SGL door(s) with the following:							
QT		DESCRIPTION	CATALOG NUMBER		FINIS	MFR	
Y					H		
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE	
1	EA	STOREROOM LOCK	ALX80T RHO		626	SCH	
1	EA	FSIC CORE	23-030		626	SCH	
1	EA	SURFACE CLOSER	4040XP REG OR PA AS REQ		689	LCN	
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE	

**OC FAIR AND EVENT CENTER
CAMPGROUND –
SHOWER & RESTROOM BUILDING**

7/15/25

DSA SUBMITTAL

QT Y		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
1	EA	WALL STOP	WS406/407CCV REQUIRES BACKING IN WALL		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	545A OR AS DETAILED		A	ZER

DOORS UNDER 36" DO NOT MEET 32" CLEAR WIDTH

Hardware Group No. 04 - PRIVACY I/S WS NO CLOSER

For use on Door #(s):

A110-B A110-C A110-D A110-E A111-B A111-C
A111-D A111-E

Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	PRIVACY LOCK	ALX40 RHO		626	SCH
1	EA	WALL STOP	WS406/407CCV REQUIRES BACKING IN WALL		626	IVE
1	EA	GASKETING	188SBK PSA		BK	ZER

Hardware Group No. 05 - PRIVACY O/S EXT

For use on Door #(s):

B208 B209 B210

Provide each SGL door(s) with the following:

QT Y		DESCRIPTION	CATALOG NUMBER		FINIS H	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP		630	IVE
1	EA	PRIVACY LOCK	ALX40 TLR		626	SCH
1	EA	SURFACE CLOSER	4040XP CUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA - OMIT AT OVERHANG OMIT AT OVERHANG		AA	ZER
1	EA	GASKETING	188SBK PSA		BK	ZER
1	EA	DOOR SWEEP	39A		A	ZER
1	EA	THRESHOLD	545A OR AS DETAILED		A	ZER

End of Section

END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Provide miscellaneous glass and glazing not provided elsewhere including accessories as required for complete installation.
 - a. Provide glazing for metal doors and frames.
 - b. Provide glazing for interior aluminum frames.
 - c. Provide glazing for wood doors.

B. Related Sections:

1. Section 08 41 00: Aluminum-framed entrances and storefronts glazing.
2. Section 08 44 10: Glazed window wall assemblies glazing.
3. Section 08 51 10: Aluminum window glazing.
4. Section 10 28 00: Metal framed mirrors.

1.2 REFERENCES

- A. Glass Association of North America (GANA): Glazing Manual and Sealant Manual.

1.3 SUBMITTALS

- A. Product Data: Furnish for each type of glass and exposed glazing material.
- B. Samples: Furnish samples of exposed glazing accessories.

1.4 WARRANTY

- A. Extended Correction Period: Extend correction period to two years for following.
1. Replacing laminated glass which exhibits signs of delaminating.
 2. Replacing insulated glass which exhibits signs of moisture on sealed glass surfaces.
 3. Replacing mirrors which exhibit signs of desilvering or signs of distortion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Section includes miscellaneous glass and glazing materials for items typically furnished without glazing and where glazing is not an integral part of the assembly.
- B. Regulatory Requirements:
 - 1. Safety Glass Standard: Comply with applicable codes, CPSC 16 CFR 1201, and pass ANSI Z97.1.
 - 2. Fire Rated Glass: Provide glass identical to glass tested per ASTM E163, labeled and listed by UL or other testing and inspection agency acceptable to applicable authorities.
- C. Float Glass: Select glazing quality, clear annealed glass, ASTM C1036; nominal thickness 1/4".
 - 1. Manufacturers:
 - a. Vitro Architectural Glass (formerly PPG).
 - b. Oldcastle Glazing.
 - c. Guardian Industries Corp.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Locations: Provide where indicated as clear glass.
- D. Tempered Glass: Select glazing quality, clear float glass, fully tempered, ASTM C1048, Kind FT; nominal thickness 1/4"; safety glass.
 - 1. Manufacturers:
 - a. Vitro Architectural Glass (formerly PPG).
 - b. Oldcastle Glazing.
 - c. Guardian Industries Corp.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Locations: Provide at doors and at window openings where required by applicable codes and federal requirements.
- E. Insulated Glass: Preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space with minus 20-degree F dew point.
 - 1. Manufacturers:
 - a. Vitro Architectural Glass (formerly PPG).
 - b. Oldcastle Glazing.
 - c. Guardian Industries Corp.
 - d. Viracon.

- e. Substitutions: Refer to Section 01 25 00.
- 2. Performance: Certified to ASTM E2190 by Insulating Glass Certification Council.
- 3. System: Manufacturer's standard dual seal system compatible with glazing system, and including spacers, desiccant, and standard corner construction.
- 4. Glass: ASTM C1036, select glazing quality clear float glass; nominal 1/4" thick glass.
- 5. Safety Glass: ASTM C1048, Kind FT, fully tempered select glazing quality clear float glass; nominal 1/4" thick glass; provide at doors and impact areas where safety glass is required by applicable codes and regulations.
- 6. Total Unit Thickness: 1".
- 7. Locations: Provide at exterior windows and doors unless otherwise indicated.
- F. Spacer Shims: Silicone compatible, 50 durometer hardness; 3" long by 3/32" thick by 1/4" high.
- G. Setting Blocks: 70-90 durometer hardness; 4" long by 3/8" thick by 1/4" high standard setting blocks.
- H. Glazing Sealant: ASTM C920, Type S, Grade NS, elastomeric one-component silicone glazing sealants as recommended by sealant manufacturer for application involved.
 - 1. Manufacturers:
 - a. Dow Corning Corp.
 - b. General Electric Co.
 - c. Pecora Corp.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Structural and Butt Glazing: Provide high-modulus structural silicone glazing materials recommended by sealant manufacturer for applications where sealant bonds glass to metal system and where sealant bonds glass to glass.
 - 3. Color: As selected by Architect from manufacturer's full range of available colors.
- I. Glazing Putty: Linseed oil putty, ASTM C570, Type II; oil and resin base caulking compound for building construction; knife grade.1.
 - 1. Manufacturers:
 - a. DAP, Inc.
 - b. Substitutions: Refer to Section 01 25 00.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean glazing channels and framing members to receive glass immediately before glazing; remove coatings not firmly bonded to substrate.
- B. Apply primer to joint surfaces where recommended by sealant manufacturer.

3.2 INSTALLATION

- A. Comply with GANA Glazing Manual and Sealant Manual and glazing manufacturer recommendations and installation instructions.
 - 1. Do not allow glass to touch metal surfaces.
 - 2. Comply with applicable code requirements and NFPA 80 for glass in fire rated openings.
- B. Place setting blocks at quarter points in thin course of sealant.
- C. Install removable stops with glass centered in space with spacer shims at 2'-0" intervals on both sides of glass, 1/4" below sightline.
- D. Sealant Glazing: Fill gap between glass and stops with sealant to depth equal to bite of frame on glass but not more than 3/8" below sightline.
 - 1. Apply sealant to uniform and level line, flush with sightline; tool or wipe sealant surface for smooth appearance; at exterior locations tool sealant so water is carried away from glass.

3.3 CLEANING

- A. At areas subject to potential impact mark glass after installation by crossed streamers attached to framing and held away from glass; do not apply markers to surface of glass.
- B. Remove nonpermanent labels immediately after sealant cures; cure sealants for high early strength and durability.
- C. Remove and replace glass which is broken, chipped, cracked, abraded or damaged during construction period, including natural causes, accidents and vandalism.

END OF SECTION

SECTION 08 91 00

LOUVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide formed metal louvers and frames, with screens, attachment hardware, and accessories as required for complete finished installation.
- B. Related Sections:
 - 1. Section 08 11 10: Steel door louvers.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature for each type of louver.
- B. Shop Drawings: Indicate profile of frame, details, relation to adjacent construction, flashing, blade configuration, duct work connection, screens, and percentage of free air opening.
- C. Samples: Furnish samples of metal finish.
- D. Certificates: Where performance requirements are included, provide AMCA Certified Rating Seal indicating louvers comply with requirements.

1.3 SITE CONDITIONS

- A. Take site dimensions affecting louvers prior to fabrication.
- B. Ensure openings are properly prepared and flashings are correctly located to divert moisture to exterior.
- C. Protect adjacent surfaces, finishes and materials from damage during installation of louvers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The Airolite Corporation.
- B. Construction Specialties, Inc. (CSI).
- C. Airline Products Co.
- D. Nystrom Building Products.
- E. Ruskin.

F. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide formed metal louvers and frames, with screens, attachment hardware, and accessories.
- B. Performance Criteria: Where indicated, comply with specific performance requirements; unit performance ratings determined in compliance with Air Movement and Control Association (AMCA) Standard 500.
 - 1. Free Area: Minimum 45% based on 48" by 48" louver.
 - 2. Static Pressure Loss: Maximum 0.15" of water gage at airflow of 1000 fpm free air velocity.
 - 3. Water Penetration: Maximum 0.05 oz/sf of free area at intake airflow of 1000 fpm free area velocity.
 - 4. Wind-Driven Rain: Louvers shall achieve a wind-driven rating in conformance with applicable codes and regulations but not less than an A rating on a standard size louver as defined in AMCA 500 - L.
- C. Steel Sheet: Minimum 16 gage steel, ASTM A924 and A653 with G90 galvanized coating, mill phosphatized.

2.1 FABRICATION

- A. Louvers: Manufacturer's standard fabrication for types specified and configurations indicated on Drawings.
 - 1. Type: Sheet metal louvers formed of shapes as indicated; Contractor option aluminum sheet or galvanized steel sheet unless otherwise indicated.
- B. Bird Screen for Exterior Louvers: Minimum 0.063" diameter wire, 1/2" interwoven square mesh.
 - 1. Wire: Stainless-steel.
 - 2. Frame: Match louver.
- C. Fabricate louvers to maximum extent possible and disassemble as necessary for shipping and handling limitations; clearly mark units for reassembly and installation.
 - 1. Fabricate frames, including integral sills, to suit adjacent construction with tolerances for installation.
 - 2. Fabricate sill extension, flashings, wall anchors, structural supplementary sub-framing, and accessories as required for complete system; use same materials as provided for louvers.

- D. Join frame members and louver blades by welding; maintain equal blade spacing, including separation between blades and frame head and sill; maintain uniform appearance.
- E. Shop Primed Louvers: Manufacturer's standard thermosetting prime coating compatible with paints specified in Section 09 90 00 - Painting and Coating.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install louvers in accordance with manufacturer recommendations and installation instruction, properly aligned and level.
- B. Secure louver rigid with concealed fasteners of non-corrosive metals to suit materials being encountered and to resist anticipated loads.
- C. Coordinate installation method with application of adjacent backing and structural elements, and mechanical work.
- D. Set and tie into flashings to ensure diversion of moisture to exterior.
- E. Hinge screens for access.

END OF SECTION

SECTION 09 21 00

GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide gypsum board systems including gypsum board, joint treatment, acoustical accessories, and general accessories for complete installation.
- B. Related Sections:
 - 1. Section 07 21 00: Building thermal insulation.
 - 2. Section 07 84 00: Firestopping.
 - 3. Section 09 30 00: Cementitious backer unit tile substrates.

1.2 REFERENCES

- A. ASTM C840: Application and Finishing of Gypsum Board.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination,
 - 1. Openings: Obtain dimensions and locations from other trades and provide openings and enclosures for accessories, specialties, equipment, and ductwork.
 - 2. Large Format Tile: Tile Council of North America (TCNA) requires framing at large format tile to be maximum 16" on center and for maximum deflection of L/720 where large format tile as defined by TCNA is indicated.

1.4 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature for framing, insulation, gypsum board, and acoustical accessories.
- B. Samples: Submit samples of special texture finish.
- C. Manufacturer's Certification: Furnish manufacturer's certification indicating products comply with Contract Documents and applicable codes.

1.5 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for adhesives, sealants, and caulks.
- B. Level 4 Finish Mock-Up: Provide Level 4 finish mock-up not less than 100 square feet in location acceptable to Architect. Approved mock-up may be incorporated into Project.

1.6 PROJECT CONDITIONS

- A. Do not begin installation of interior gypsum board until space is enclosed, space is not exposed to other sources of water, and space is free of standing water.
- B. Maintain areas to receive gypsum board at minimum 50-degree F for 48 hours prior to application and continuously after application until drying of joint compound is complete; comply with ASTM C840.
- C. Immediately remove from site gypsum board for interior use exposed to water, including gypsum board with water stains, with signs of mold, and gypsum board with mildew.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. National Gypsum Co.
- B. Georgia-Pacific Corp.
- C. United States Gypsum Co., USG Corp.
- D. PABCO
- E. Hardie
- F. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide gypsum board assemblies including gypsum board, joint treatment, acoustical accessories, and general accessories.
 - 1. Systems Responsibility: Provide products manufactured by or recommended by manufacturer of gypsum board to maintain single-source responsibility for system.
- B. Performance Requirements: Perform gypsum board systems work in accordance with recommendations of ASTM C840 unless otherwise specified.
- C. Regulatory Requirements, Fire-Ratings: Provide systems listed in applicable code or by Underwriter's Laboratory, Gypsum Association (GA) File No's in GA-600 Fire Resistance Design Manual or other listing approved by applicable authorities.
- D. Gypsum Board: Comply with ASTM D3273, maximum permissible lengths; ends square cut, tapered edges on boards to be finished.
 - 1. Project Typical: Moisture Resistant, ASTM C1396, Type X, fire rated gypsum board, unless otherwise **specified as a substrate for a particular finish, condition, or location.**

- a. Georgia Pacific : DensArmor Plus Interior Panel
 - b. National Gypsum: Gold Bond XP
 - c. PABCO Glass Interior
 - d. Substitutions: Refer to Section 01 25 00.

- 2. Tile Substrates: Cementitious backer units or Gypsum Board Tile Backer
 - a. Georgia Pacific: Dens Shield Tile Backer
 - b. USG Sheetrock: Durock
 - c. National Gypsum: eXP
 - d. PABCO
 - e. Substitutions: Refer to Section 01 25 00

- 3. Tile Substrates: Cementitious backer units specified in Section 09 30 00 - Tiling.

- 4. Cementitious Backer Units for FRP and Shower/Tub Surrounds: ANSI A118.9 aggregated Portland cement with woven glass-fiber mesh on both faces; approximately 1/2" thick; UL fire rated as required for fire rated assemblies.
 - a. Manufacturers:
 - 1) National Gypsum Co./PermaBase Cement Board.
 - 2) USG Industries, Durabond Division/Durock.
 - 3) Custom Building Products/Wonderboard.
 - 4) James Hardie Building Products/Hardibacker.
 - 5) Substitutions: Refer to Section 01 25 00.

 - b. Contractor Option Coated Glass Mat Backer Units: Georgia Pacific/DenShield, UL fire rated as required to maintain integrity of fire rated assemblies.

- 5. Standard Gypsum Sheathing: ASTM C1396, Type X, asphalt impregnated core with water resistant surfaces; plain back; square ends, V-tongue and groove long edges.

- 6. Sheathing: Silicone treated glass mat gypsum sheathing, ASTM C1177, Type X, 5/8" thick unless otherwise indicated. Coordinate with exterior insulation system manufacturer requirements.
 - a. Manufacturers:
 - 1) Georgia Pacific/DensGlass Gold.
 - 2) Substitutions: Refer to Section 01 25 00.

- 7. Extended Exposure Gypsum Board: Fire rated Type X gypsum board designed specifically for extended exposure to moisture during construction; ASTM C1177; provide with score of 10 when tested using ASTM D3273 for mold resistance.
 - a. National Gypsum/eXP Extended Exposure Sheathing.
 - b. Georgia Pacific/DensArmor Plus or DensGlass.
 - c. USG/Sheetrock Fiberock Aqua Tough Sheathing.

- d. Substitutions: Refer to Section 01 25 00.
- 8. Fiberglass Mat Faced Gypsum Roof Board: coordinate with requirements of roofing membrane manufacturer.
 - a. USG Securock Glass-Mat Roof Board.
 - b. Georgia-Pacific DensDeck Prime Roof Board.
 - c. Substitutions: Refer to Section 01 25 00.
- E. Gypsum Board Accessories: Comply with ASTM C840.
 - 1. Provide protective coated steel corner beads and edge trim; type designed to be concealed in finished construction by tape and joint compound.
 - 2. Corner Beads: Manufacturer's standard metal beads.
 - 3. Edge Trim: "J", "L", "LK", or "LC" casing beads.
 - 4. Reinforcing Tape, Joint Compound, Adhesive, Water, Fasteners: Types recommended by system manufacturer and conforming to ASTM C475.
 - a. Typical Joint Compound: Chemical hardening type for bedding and filling, ready-mixed or powder vinyl type for topping.
 - 5. Control Joints: Back to back casing beads.
 - a. Back control joints with 4 mil thick polyethylene air seal.
 - 6. Reveals: Extruded aluminum special trim pieces in manufacturer's standard or custom shapes to conform to configurations and dimensions indicated.
 - a. Manufactures:
 - 1) Fry Reglet Corp./Drywall Moldings.
 - 2) Gordon Inc./Final Forms I Drywall Trims.
 - 3) Substitutions: Refer to Section 01 25 00.
- F. Acoustical Accessories: Provide as indicated and as required to achieve acoustical ratings indicated.
 - 1. Resilient Channels: Provide resilient channels where indicated and where required to provide required sound transmission classifications.
 - a. USG/RC-1.
 - b. ClarkDietrich/RC-Deluxe.
 - c. Substitutions: Refer to Section 01 25 00.
 - 2. Acoustical Insulation: Preformed mineral fiber, ASTM C665, Type I; friction fit type without integral vapor barrier; as required to meet STC ratings indicated, or of thickness indicated.

3. Acoustical Sealant: ASTM C919, type recommended for use in conjunction with gypsum board. Paintable, non-shrinking and non-cracking where exposed, nondrying, nonskinning, nonstaining, and nonbleeding where concealed.
 - a. Acoustical Sealant Manufacturers:
 - 1) USG/Sheetrock Acoustical Sealant.
 - 2) Tremco/Acoustical Sealant.
 - 3) Pecora/AC-20.
 - 4) Substitutions: Refer to Division 1.
4. Electrical Box Pads: Provide at outlet, switch and telephone boxes in walls with acoustical insulation.
 - a. Electrical Box Pad Manufacturers for Non-Fire Rated Partitions:
 - 1) Harry A. Lowry & Associates (800.772.2521)/Lowry's Electrical Box Pads.
 - 2) Tremco Sheet Caulking (650.572.1656).
 - 3) Fire rated partition material manufacturers.
 - 4) Substitutions: Refer to Section 01 25 00.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Gypsum Board Installation: Install in accordance with ASTM C840 and manufacturer's recommendations.
 1. Use screws when fastening gypsum board to furring and to framing.
 2. Erect gypsum board with ends and edges occurring over firm bearing.
 - a. Ensure joints of second layer do not occur over joints of first layer in double layer applications.
 3. For fire rated systems comply with requirements for fire ratings.
 4. Place control joints to be consistent with lines of building spaces and as directed by Architect.
 - a. Provide where system abuts structural elements.
 - b. Provide at dissimilar materials.
 - c. Lengths exceeding 30'-0" in partitions.
 - d. Ceiling areas exceeding 50'-0" or 2500 square feet.
 - e. Wings of "L", "U" and "T" shaped ceilings.
 5. Place corner beads at external corners; use longest practical lengths.
 6. Place edge trim where gypsum board abuts dissimilar materials.

7. Tape, fill, and sand exposed joints, edges, corners and openings to produce surface ready to receive finishes; feather coats onto adjoining surfaces.
 8. Finishing: Comply with Gypsum Association (GA) "Levels of Gypsum Board Finish".
 - a. GA Level 4 (Typical): Provide three-coat finishing and sanding is required for surfaces indicated to be painted; provide flush, smooth joints and surfaces ready for applied paint finishes.
 9. Remove and replace defective work.
- B. Acoustical Accessories Installation:
1. Place acoustical insulation tight within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
 2. Place acoustical sealant within partitions in accordance with manufacturer's recommendations; install acoustical sealant at gypsum board perimeter at:
 - a. Metal Framing: One or two beads.
 - b. Base layer and face layer.
 - c. Penetrations of partitions.
 3. Tolerance: Maximum 1/4" space between gypsum board at floor, ceiling, and penetrations and sealed with acoustical sealant.
 4. Install electrical box pads with pads molded and pressed on back and all sides of box, closing openings, in accordance with manufacturer's instructions, for complete acoustical barrier.

END OF SECTION

SECTION 09 24 00

PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stucco: Provide three-coat Portland cement plaster (stucco) with rainscreen, metal lath, and accessories as required for complete finished system.
2. Base for Surface Bonded Masonry: Provide two-coat Portland cement plaster base for surface bonded thin set veneer systems with metal lath and accessories as required for complete finished system.

B. Related Sections:

1. Section 04 22 00: Concrete Unit Masonry
2. Section 07 28 00: Weather barrier underlayment.
3. Section 09 01 20: Plaster patching.
4. Section 09 90 00: Painting of stucco.

1.2 REFERENCES

- A. ASTM C926: Application of Portland Cement Based Plaster.
- B. ASTM C1063: Installation of Lathing and Furring for Portland Cement Plaster.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product information for each lathing material and accessory, and for plaster materials.
- B. Shop Drawings: Indicate locations of control and expansion joints where not shown on Drawings. Minimum spacing of control joints shall be based upon TSIB guidelines.
- C. Samples: Furnish 24" by 24" stucco samples using materials and methods specified including lath.

1.4 QUALITY ASSURANCE

- A. Mock-Ups: Provide not less than 100 sf mock-up of each type of plaster; approved mock-ups may be incorporated into Project.

1.5 SITE CONDITIONS

- A. Take precautionary measures to ensure plaster is not subjected to excessive sun and wind which could cause uneven and excessive evaporation, premature dehydration, or cracking.

- B. Cold-Weather Requirements: Do not apply plaster unless minimum ambient temperature of 40 degrees F has been and continues to be maintained for minimum 48 hours prior to application and until plaster is cured.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide three coat Portland cement plaster (stucco) and two-coat Portland cement plaster base for bonded masonry, with metal lath and accessories.
- B. Regulatory Requirements: Comply with applicable codes.
- C. Portland Cement Plaster: Provide either ready-mixed materials unless otherwise approved in writing by Architect, complying with ASTM C926.
 - 1. Scratch and Brown Coat Materials:
 - a. Cement: Normal Type 1 or 1A Portland cement, ASTM C150.
 - b. Hydrated Lime: Special finishing hydrated lime, Type S, ASTM C206.
 - c. Aggregate: Natural sand, conforming to ASTM C897 or C144.
 - 2. Brown Coat Water Acrylic Admix: Acrylic polymer specifically manufactured for use in Portland Cement Plaster (Stucco) applications and which will not detrimentally affect finish.
 - a. Manufacturers:
 - 1) Larsen Products Corp/Acrylic Admix 101.
 - 2) BASF/Thoro Acryl 60.
 - 3) Chem-Masters Corp/Cretelox.
 - 4) Substitutions: Refer to Section 01 25 00.
 - 3. Finishing Materials: Same as brown coat with acrylic admix with integral color and white cement. Factory premix finish coat is acceptable.
 - a. Provide white cement from a single manufacturer and clear silica sand at applications indicated to have integral color.
 - b. Integral Color: Pure, non-fading, mineral oxide color conforming to ASTM C979 and designed and mixed to provide uniform color finish coat.
 - 1) Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 - 4. Proprietary Finishing Materials: Provide proprietary Portland cement-based factory mixed integral color finishing materials as indicated and as approved by Architect.
 - a. Manufacturers:
 - 1) La Habra Products, Inc.

- 2) Merlex Stucco, Inc.
 - 3) Omega Products Corp.
 - 4) Substitutions: Refer to Section 01 25 00.
 - b. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
5. Proprietary Finishing Materials: Provide proprietary acrylic based factory mixed integral color finishing materials as indicated and as approved by Architect.
 - a. Manufacturers:
 - 1) Dryvit Systems/Textured Acrylic Finish.
 - 2) Omega Products Corp./Akroflex.
 - 3) La Habra Products, Inc./DPR Acrylic Finish.
 - 4) Senergy, Inc./Acrylic Finish.
 - 5) Sto Corp./Stolit.
 - 6) Substitutions: Refer to Section 01 25 00.
 - b. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
6. Water: Clean, fresh and free from injurious amounts of oil, acid, alkali, organic matter or other deleterious substances.
7. Bonding Agent: Conform to ASTM C932.
 - a. Manufacturers:
 - 1) Larsen Products Corp./Weld-Crete.
 - 2) BASF/Thorobond.
 - 3) Chem-Masters Corp./Polyweld.
 - 4) Substitutions: Refer to Section 01 25 00.
- B. Metal Components: Comply with requirements of ASTM C1063.
 1. Manufacturers:
 - a. Phillips Manufacturing Company
 - b. Alabama Metal Industries Corp (AMICO).
 - c. ClarkDietrich Building Systems.
 - d. Substitutions: Refer to Section 01 25 00.
 2. Exterior Components: Hot-dip galvanized finish; ASTM A924 and A653 minimum G90 for 18 gage and lighter formed metal products, ASTM A123 galvanized after fabrication for 16 gage and heavier products.
 - a. Exposed Exterior Components: Zinc accessories unless fully concealed in plaster.

3. Suspension System: Size to comply with referenced standards.
 - a. Main Runners: Hot or cold-rolled steel.
 - 1) Main Carrying Channels: Minimum 16 gage, 1-1/2" by 1/2".
 - 2) Furring Channels: Minimum 16 gage, 3/4" by 1/2".
 - b. Hangers: Size and type to suit application and to rigidly secure system in place, with maximum deflection of L/360.
 - 1) Hanger Wire: ASTM A641, Class 1 galvanized.
 - 2) Hanger Rods and Flats: Mild steel.
 - c. Lateral Bracing: Minimum 16 gage cold-rolled steel.
 - d. Anchorage and Fastening: Approved devices of type and size to suit application and to rigidly secure suspension system.
 4. Exterior Metal Lath: Galvanized expanded diamond mesh; minimum 2.5 psy at vertical applications, 3.4 psy at horizontal applications.
 - a. Backing: Weather resistive barrier system specified in Section 07 28 00 – Weather Barrier/Underlayment.
 - b. Self-Furring: Where over solid substrate, provide "V" groove type to hold lath approximately 1/4" from supporting base.
 - c. Tie Wire: ASTM A641, soft temper, Class 1 zinc coated; minimum 16 gage for tying metal lath to furring channels and metal lath to metal lath.
 5. Inside Corner Mesh: Minimum 26-gage steel; perforated or expanded flanges or clips shaped to permit complete embedding in plaster; minimum 2" by 2" size.
- C. Accessories: Provide as indicated, as recommended by referenced standards, and as required for complete installation.
1. Manufacturers:
 - a. Keene Products from Metalex, a Division of The Koller Group.
 - b. Delta Star, Inc., Superior Metal Trim.
 - c. Brand X Metals.
 - d. Lath manufacturers.
 - e. Substitutions: Refer to Section 01 25 00.
 2. Casing Beads and Base Screeds: Minimum 26-gage, square edges at casing beads, drip type base screeds; provide with expanded flanges.
 3. Expansion Joints: Two-piece slip type joints; commonly referred to as No. 40.
 4. Control Joints: One-piece metal joint designed to interlock with plaster similar to Keene/XJ15-3.

5. Aluminum Vent Strips and Channel Screeds: Extruded aluminum alloy 6063 and temper T5 or T6, minimum 0.05" thick; with manufacturer's standard baked-on finish.

- a. Manufacturers:

- 1) Fry Reglet Corp./Plaster Moldings.
- 2) Gordon Inc./Final Forms II.
- 3) Substitutions: Refer to Section 01 25 00.

- b. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.

- D. Anchorages: Tie wire, nails, screws and other approved metal supports, of type and size to suit application.

1. Staples not permitted.

2.2 PLASTER MIXES

- A. Provide plaster mixes in accordance with ASTM C926 as appropriate to the substrate indicated and the approved samples.
- B. Mix only as much plaster as can be used in one hour.
- C. Mix materials dry, to uniform color and consistency, before adding water.
- D. Protect mixes from frost, dust and evaporation.
- E. Do not retemper mixes after initial set has occurred.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Coordinate suspended work with structural work to ensure inserts and structural anchorage provisions have been installed to receive hangers.
 1. Coordinate location of hangers with other work.
- B. Prior to application ensure mechanical and electrical services behind surfaces to receive cement plaster have been tested and approved.
- C. Ensure framing has been properly installed and rigidly secured.

3.2 INSTALLATION

- A. Erect furring and lath in accordance with ASTM C1063.
- B. Install work true to lines and levels and to provide surface flatness with maximum variation of 1/8" in 10'-0" in any direction.

- C. Isolation: Isolate lathing and metal support system where it abuts building structure horizontally, and where partition/wall work abuts overhead structure, to prevent transfer of building loads into plaster.
 - 1. Install slip or cushion type joints to absorb deflections but maintain lateral support.
- D. Frame both sides of expansion joints independently unless otherwise indicated, do not bridge joints with furring and lathing or accessories.
- E. Fixture Support Framing: Install supplementary framing, blocking and bracing where work is indicated to support fixtures, equipment, services and similar work requiring attachment and support.
- F. Coordinate installation of anchors, blocking, electrical and mechanical work which is to be placed in or behind framing; allow such items to be installed after framing is complete.
- G. Install expansion and control joints so plaster areas do not exceed 120 ft², and with area sides having a maximum one to two and a half (1:2-1/2) ratio, unless otherwise approved by Architect.
- H. Suspension System: Install to heights indicated on Drawings.
 - 1. Install independent of walls, columns and overhead work.
 - 2. Use hangers spaced maximum 4'-0" on center.
 - 3. Space main carrying channels maximum 4'-0" on center and not more than 6" from perimeter walls; lap splices minimum 12" and secure together 2" from each end of splice.
 - 4. Securely fix carrying channels to hangers to prevent turning or twisting and to develop full strength of hangers.
 - 5. Place furring channels perpendicular to carrying channels, not more than 2" from perimeter walls; rigidly secure to carrying channels.
 - 6. Lap splices minimum 8" and secure together 1" from each end of splice.
 - 7. Reinforce openings in suspension system which interrupt main carrying channels or furring channels, with lateral channel bracing; extend bracing minimum 24" past openings.
 - 8. Laterally brace suspension system as required to resist seismic loads, including uplift.
- I. Metal Lathing: Apply lath taut, with long dimension perpendicular to supports; secure end laps with tie wire where they occur between supports; lap ends minimum 1" and sides 1/2"; secure with tie wires.
 - 1. Continuously reinforce internal angles.

2. Place 6" wide x 12" long strips of metal lath diagonally at corners of openings; secure rigidly in place.
 3. Place 6" wide strips of metal lath at junctions of dissimilar materials; place parallel with dissimilar materials; secure rigidly in place.
- J. Installation of Metal Accessories:
1. Fasten in place true to line and in correct relation to adjacent materials and as required to prevent dislodging and misalignment by subsequent operations.
 2. Fasten at both ends and at maximum 12" on center along sides.
 3. Bring grounding edge of accessories to true lines, plumb, level, and straight.
 4. Install accessories to provide required depth of plaster and to bring plaster surface to required plane.
 5. Install continuous corner reinforcement for full length of external corners.
 6. Install sill and drip screeds with paper sheathing and lath installed over attachment flange of screeds.
 7. Beads: Use single length of metal beads wherever length of run does not exceed longest standard stock length available; miter or cope corners.
 - a. Provide casing beads where plaster abuts dissimilar construction and at perimeter of openings where edges of plaster will not be concealed by other work.
- K. Portland Cement Plaster: Conform to ASTM C926.
1. Stucco: Apply three coat cement plaster system, scratch, brown, and finish coats.
 2. Base for Surface Bonded Masonry: Apply two coat cement plaster system, scratch and brown coats.
 3. Apply each base coat (scratch and brown) to minimum thickness of 3/8"; allow each coat to moist cure for minimum period of 48 hours;
 - a. Moist cure first base coat (scratch coat) during 48-hour period.
 4. Allow base coats to cure for minimum 7 days prior to application of finish coat.
 5. Evenly dampen base coat, to ensure uniform suction, and apply finish coat; apply thickness sufficient to secure required texture but in no case less than 1/8".
 - a. Apply pre-mixed finish coat in accordance with manufacturer's recommendations.
 6. Maintain surface flatness, with maximum variation of 1/8" in 10'-0".
 7. Avoid excessive working of surface, delay troweling to avoid drawing excess fines to surface.
- L. Finish: Provide surfaces with finish to match approved sample panel and mock-up.

3.3 CUTTING AND PATCHING

- A. Cut, patch, point, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections.
- B. Repair or replace work to eliminate blisters, buckles, crazing, check cracking, dry-outs, efflorescence, sweat-outs, and similar defects.
- C. Finish cutting and patching to match undamaged plaster; patching shall not be visible in finished installation.

3.4 CLEANING

- A. Promptly remove plaster from surfaces not indicated to be plastered.
- B. Repair surfaces stained, marred or otherwise damaged during plastering.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide tile installations with accessories, as required for complete installation.
 - 1. Provide waterproofing membrane integral with tile setting beds.
 - 2. Provide cementitious backer unit tile substrate.
- B. Related Sections:
 - 1. Section 09 21 00: framing and gypsum board.

1.2 REFERENCES

- A. ANSI A108.1: Installation of Tile with Portland Cement Mortar.
- B. ANSI A108.5: Installation of Tile with Latex-Portland Cement Mortar.
- C. ANSI A108.6: Installation of Tile with Chemical Resistant Water Cleanable Tile Setting and Grouting Epoxy.
- D. ANSI A108.10: Installation of Grout in Tilework.
- E. ANSI A108.11: Interior Installation of Cementitious Backer Units.
- F. Tile Council of North America (TCNA): Handbook for Ceramic Tile Installation.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination, Large Format Tile and Framing: Tile Council of North America (TCNA) requires framing at large format tile to be maximum 16" on center and for maximum deflection of $L/720$ where large format tile as defined by TCNA is indicated.
 - 1. Coordinate with framing installation to ensure proper stud spacing and deflection limits are provided at locations where large format tile is indicated.

1.4 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature for each type of material for Project.
- B. Samples: Furnish each type of tile clearly indicating pattern, coloration and joints.
 - 1. Color Charts: Submit actual tile sections showing full range of colors, textures and patterns available for each type of tile.

2. Prepare two 12" square sample panels of each selected type of tile and grout.

1.5 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for adhesives, sealants, and caulks.

1.6 SITE CONDITIONS

- A. Provide heat and ventilation in areas where ceramic tile work is being performed, to allow tile to properly set.
- B. Take precautionary measures necessary to ensure excessive temperature changes do not occur.

1.7 WARRANTY

- A. Extended Correction Period: Provide for correcting failure of system to resist water penetration except where failure is result of structural failure of building. Repair system and pay for or replace damaged materials and surfaces.
 1. Hairline cracking due to temperature or shrinkage is not considered structural failure.
 2. Period: Two years.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. System Description: Provide tile installations with tile, grout, setting materials, and accessories as indicated.
- B. Regulatory Requirements, General:
 1. Interior Adhered Veneer: Comply with applicable California Code requirements for interior adhered veneer; maximum 20-psf.
 2. Exterior Adhered Porcelain Veneer: Comply with applicable California Code requirements for exterior adhered veneer; maximum 9-psf, 5/8" thick, 24" in any face dimension, nor more than 3-sf in total face area.
- C. Regulatory Requirements, Slip-Resistance:
 1. Slip-Resistant Hard Surfaces: Hard surface finishes to comply with requirements of authorities having jurisdiction for slip-resistant hard surfaces, including general code requirements and requirements for access for persons with disabilities.

- D. Tile: Types as indicated which could include ceramic, ceramic mosaic, quarry, paver, porcelain, stone, and glass type tiles.
1. Manufacturers:
 - a. Dal-Tile Corp.
 - b. Crossville Tile.
 - c. Summitville Tiles, Inc.
 - d. Manufacturers listed on Finish Schedule.
 - e. Substitutions: Refer to Section 01 25 00.
 2. Color, Style and Pattern: As indicated on Finish Schedule, as selected by Architect from manufacturer's full range of types of tiles indicated where not otherwise indicated
 - a. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 3. Base and Trim: Provide matching trim pieces, coordinated with sizes and coursing of adjoining flat tile as directed by Architect; types as indicated, as selected by Architect where not indicated.
- E. Portland Cement Setting Bed: Portland cement bed conforming to ANSI A108.1 and TCNA recommendations including separator sheet and reinforcing mesh.
1. Separator sheet may be deleted where over waterproof membrane.
 2. Separator sheet may be deleted where over waterproof membrane or shower pan.
- F. Latex Thin Set: Thinset bond coat, consisting of latex-cementitious mortar conforming to ANSI A118.4.
1. Manufacturers:
 - a. Laticrete International Inc.
 - b. Bostik Construction Products/Hydroment.
 - c. Custom Building Products.
 - d. Mapei Corp.
 - e. Parex USA/Mer-Krete.
 - f. Substitutions: Refer to Section 01 25 00.
- G. Latex-Cement Grout: ANSI A118.7, latex-cementitious type, uniform in color, resistant to shrinkage.
1. Manufacturers:
 - a. Laticrete International Inc.
 - b. Bostik Construction Products/Hydroment.
 - c. Custom Building Products.
 - d. Mapei Corp.
 - e. Parex USA/Mer-Krete.

- f. Substitutions: Refer to Section 01 25 00.
- 2. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
- H. Waterproofing and Crack Isolation Membrane: Manufacturer's standard liquid rubber polymer designed specifically for application under tile in non-immersed applications.
 - 1. Manufacturers:
 - a. Laticrete International Inc./9235 Waterproof Membrane.
 - b. Bostik Construction Products/Hydroment Ultra-Set.
 - c. Custom Building Products/RedGard Membrane.
 - d. Mapei Corp/Mapelastic Aqua Defense.
 - e. Parex USA/Mer-Krete Hydro-Guard 2000.
 - f. Substitutions: Refer to Section 01 25 00.
- I. Cementitious Backer Units: ANSI A118.9 aggregated Portland cement with woven glass-fiber mesh on both faces; approximately 1/2" thick; UL fire rated as required to maintain integrity of fire rated assemblies.
 - 1. Manufacturers:
 - a. USG Industries, Durabond Division/Durock.
 - b. National Gypsum Co./PermaBase Cement Board.
 - c. Custom Building Products/Wonderboard.
 - d. Substitutions: Refer to Section 01 25 00.
 - 2. Contractor Option Coated Glass Mat Backer Units: Georgia Pacific/DenShield, UL fire rated as required to maintain integrity of fire rated assemblies.
- J. Cleaning and Sealing Materials: As recommended by tile and grout manufacturers, such as Bostik Construction Products/Hydroment CeramaSeal.
- A. Special Tile Trim Pieces: Provide as indicated on Drawings.
 - 1. Manufacturers:
 - a. Schluter Systems L.P.
 - b. Substitutions: Refer to Section 01 25 00.

2.2 MIXES

- A. Mix and proportion cementitious materials for site-made leveling coats, setting beds and grout as recommended by the TCNA Handbook for Ceramic Tile Installation.
- B. Mix and proportion pre-mixed setting beds and grout materials in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to installing tile, ensure surfaces are level; comply with TCNA and tile manufacturer recommendations but not greater than following.
 - 1. Bed Set Tile Tolerance: Maximum surface variation of 1/4" in 10'-0".
 - 2. Thin Set Tile Tolerance: Maximum surface variation of 1/8" in 10'-0".
- B. Ensure surfaces are clean and well cured.
 - 1. Drains: Where indicated, ensure surfaces are properly sloped to drains.
- C. Do not commence work until surface conditions are within tolerances required for proper installation; apply latex leveling material where necessary to meet required tolerances.
- D. Waterproof and Crack Isolation Membrane: Install waterproof membrane at tile areas located above grade, in accordance with manufacturer's recommendations; extend membrane minimum 6" up walls.
 - 1. Comply with waterproof membrane manufacturer recommendations for installation of tile over waterproof membrane.
- E. Backer Units: Install units in accordance with ANSI A108.11, manufacturer's recommendations, and as required to provide fire ratings indicated on Drawings.
- F. Floor Sealer: Apply vapor retarding floor sealer on concrete floors indicated to receive epoxy set tile in accordance with manufacturer recommendations and installation instructions.

3.2 INSTALLATION

- A. Install tile in accordance with referenced ANSI Standards and TCNA recommendations for type of substrate and indicated setting method.
 - 1. Complexity of TCNA variations in types of tile installation systems and potential for changes to surrounding conditions during design and construction makes exact listing of potential conditions improbable.
 - 2. Contractor, installers, and manufacturer representatives shall inform Architect where actual conditions are not covered and where providing similar materials and systems do not comply with TCNA or manufacturer recommendations.
 - a. Where specified or similar materials and systems do not comply with TCNA or manufacturer recommendations submit proposed substitutions along with statement substitutions are of comparable quality to specified materials.

- B. Following systems shall form the basis of tile installation systems required for Project. Where Project conditions vary from TCNA and manufacturer recommendations, notify Architect immediately. Where different use similar materials and systems as appropriate.
1. Bed Set Floors over Concrete: TCNA F111, with latex cement bond coat.
 2. Bed Set Floors over Waterproof and Crack Isolation Membrane over Concrete: TCNA F121, with latex cement bond coat.
 3. Bed Set Floors over Waterproof and Crack Isolation Membrane over Wood: TCNA F141, with latex cement bond coat.
 4. Latex-Cement Thin Set Floors over Concrete: TCNA F113.
 5. Latex-Cement Thin Set Floors over Waterproof and Crack Isolation Membrane: TCNA F122.
 6. Latex-Cement Thin Set Floors over Acoustic Underlayment: TCNA F122.
 7. Latex-Cement Thin Set Floors over Cementitious Backer Unit over Wood: TCNA F144.
 8. Latex-Cement Thin Set Wall Tile over Cementitious Backer Units: TCNA W244.
 9. Latex-Cement Thin Set Wall Tile over Coated Glass Mat Backer Units: TCNA W245.
- C. Place tile in accordance with patterns indicated on Drawings or as directed by Architect; carefully plan tile layouts, ensure pattern is uninterrupted from one surface to the next and through doorways.
1. Apply latex thin set to back of tile where necessary to ensure 100% bond between bond coat and substrate; replace tiles which break due to voids between tile and substrate.
- D. Place stone thresholds level and true to line; in correct alignment with tile, doors and partitions.
- E. Neatly cut tile around fixtures and drains; accurately form corners, base, intersections and returns.
1. Base, Coves: Flush cove type with base grout joint on wall, cove tile on floor, unless otherwise indicated.
 2. Corners and Edges: Bullnose tile unless otherwise indicated.
- F. Locate expansion joints, control joints, contraction joints, and isolation joints where indicated; where not indicated, provide as recommended by TCNA Handbook and as approved by Architect.
1. Install special trim pieces as indicated on Drawings and in accordance with manufacturer recommendations and installation instructions, true to lines and levels indicated and in correct relationship with tile and adjacent materials.

- G. Ensure tile joints are uniform in width, subject to normal variance in tolerance allowed in tile size; ensure joints are watertight, without voids, cracks, excess mortar or grout.
- H. Sound tile after setting, remove and replace hollow sounding units.
- I. Allow tile to set for a minimum 48 hours prior to grouting.
- J. Grout tile to comply with recommendations of TCNA and as specified.
- K. Leave completed installation free of broken, damaged and faulty tile.

3.2 CLEANING AND SEALING

- A. Clean tile surfaces free of foreign matter upon completion of grouting.
- B. Seal tile and grout surfaces where recommended by manufacturer for materials and applications involved; comply with manufacturer's recommendations.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide painting and finishing of exposed items and surfaces requiring field painting and finishing including shop primed items.
 - 1. Specified surface preparation, priming and coats of paint are in addition to shop-priming and surface treatment specified under other sections of work.
 - 2. Painting and finishing include field finishing of exterior and interior items not listed as "Surfaces not to be Painted" unless clearly indicated otherwise.
 - 3. Painting and finishing include field finishing of select shop finished items such as mechanical grilles and registers and shop primed items such as access panels and louvers in doors, to match adjacent surfaces.
 - a. Match adjacent surfaces in color and sheen unless otherwise indicated.
 - 4. Field paint exposed bare and covered pipes, ducts, and hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work in occupied spaces.
 - 5. Wood Doors: Contractor option to factory finish or field finish, coordinate with Section 08 14 00 - Wood Doors.
- B. Surfaces Not to be Painted:
 - 1. Finished items including finished metal surfaces.
 - 2. Walls and ceilings in concealed areas and generally inaccessible areas.
 - 3. Moving parts of operating mechanical and electrical units.
 - 4. Labels: Keep equipment identification and fire rating labels free of paint.
 - 5. Plastic smoke stops and weather-stripping at doors.
- C. Related Sections: Shop priming of ferrous metal items is included under various Specification sections.
 - 1. Section 06 40 00: Shop finishing of architectural woodwork.

1.2 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information, including paint label analysis and application instructions for each material.

- B. Samples: Submit samples for review of color and texture; provide list of material and application for each coat of each finish sample.
 - 1. Brush-Outs: Submit samples of each color and material with texture to simulate actual conditions, on hardboard.
 - a. Submit 8" by 10" samples of wood finishes on actual wood surfaces; label and identify each as to location and application.
 - b. Submit samples of concrete masonry (maximum 4" square) defining filler, prime and finish coats.
- C. Manufacturer Certificates: Furnish certificates from each manufacturer stating materials are top quality lines and suitable for intended use on this Project.
 - 1. CALGreen: Submit additional information as necessary to verify compliance with CALGreen requirements.
 - 2. CALGreen Requirements: Refer to Section 01 35 15 – CALGreen Environmental Requirements and comply with applicable CALGreen Checklist indicating requirements applicable to Project.
 - a. Comply with CALGreen requirements including those relative to finish material pollution control for paints and coatings.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, with:
 - 1. Name of material, color and sheen.
 - 2. Manufacturer's name, stock number and date of manufacture.
 - 3. Contents by volume, for major pigment and vehicle constituents.
 - 4. Thinning and application instructions.

1.4 SITE CONDITIONS

- A. Apply water-base paints when temperature of surfaces and surrounding air are between 50 and 90-degrees F.
- B. Do not apply paint in rain, fog or mist; or when relative humidity exceeds 85 percent; or to damp or wet surfaces.
- C. Painting may be continued during inclement weather if areas to be painted are enclosed and heated within temperature limits specified.
- D. Provide additional temporary ventilation during interior application of paints to eliminate volatile organic compound (VOC) emissions from interior spaces as quickly as possible.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Dunn-Edwards Corp.
- B. Sherwin-Williams Co.
- C. Pittsburgh Paints, PPG Pittsburgh Paints, including Glidden Professional.
- D. Vista Paint Co.
- E. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide painting and finishing of exposed items and surfaces requiring field painting and finishing including shop primed items.
 - 1. Definition: "Painting" and "coating" as used herein means systems including primers, emulsions, enamels, stains, sealers and fillers, whether used as prime, intermediate or finish coats.
- B. Regulatory Requirements:
 - 1. Volatile Organic Compound (VOC) Emissions: Furnish materials approved for use by applicable air quality management district for limitations of volatile organic compounds for architectural or special coatings as applicable.
- C. Material Quality: Provide top line quality commercial grade (professional painter) paints; materials not bearing manufacturer's identification as their top line product shall not be acceptable.
 - 1. Primers: Provide premium grade primers recommended by paint manufacturer for substrates indicated and for finish systems specified.
 - 2. Undercoats and Barrier Coats: Provide undercoat paints produced by same manufacturer as finish coats; use only thinners approved by paint manufacturer and use only within recommended limits.
 - 3. Finish Coats: Provide finish coats capable of being washed with mild detergent without loss of color, sheen, or pigments.
 - a. Color pigments: Pure, non-fading, applicable types to suit substrates and service indicated; no lead content permitted.
 - 4. Finish Coat Coordination: Provide finish coats which are compatible with prime paints, undercoats, and barrier coats used.
 - a. Review other Specification sections in which prime paints are provided; ensure compatibility of total coatings systems.

- b. Upon request from other trades furnish information on characteristics of finish materials proposed for use.
 - c. Provide barrier coats over incompatible primers or remove and prime as required.
 - d. Notify Architect in writing of any anticipated problems in use of specified coating systems with substrates primed by others.
- D. Colors and Finishes: Prior to commencement of painting work, Architect will furnish color chips for surfaces to be painted.
 - 1. Use of proprietary names in color selection is not intended to imply exclusion of equivalent products of other manufacturers.
 - 2. Final acceptance of colors will be from samples applied on site.
 - 3. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Inspection: Examine areas and conditions under which painting work is to be applied.
 - 1. Start of painting work indicates acceptance of surfaces and conditions of surfaces and conditions within any area.
 - 2. Where exposed items or surfaces are not specifically mentioned in Schedules, paint same as adjacent similar materials or areas.
 - 3. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to a durable paint film.
- B. Perform preparation and cleaning procedures in accordance with paint manufacturer's instructions and as specified for substrate condition.
 - 1. Existing Painted Finishes:
 - a. Clean existing painted surfaces and remove oil, grease, dust, stains, scale, efflorescence, mildew, mold, algae, blisters, and non-adhering paint.
 - b. Measure adhesion of existing paints using ASTM D3359 tape test; remove existing coatings where poor adhesion is indicated.
 - c. Feather edges of severely deteriorated paint where several coats are removed as part of cleaning, to provide smooth transition for new paint.
 - d. Fill holes, cracks, and defects and fill and sand smooth, ready for new paint finish.

- C. Remove hardware, accessories, and items in place and not to be painted, or provide protection prior to surface preparation and painting; after painting reinstall removed items.
- D. Clean surfaces before applying paint; remove oil and grease prior to mechanical cleaning; program cleaning so contaminants from cleaning process do not fall onto wet, newly painted surfaces.
- E. Cementitious Materials: Prepare by removing efflorescence, chalk, dirt, grease, oils, and by roughening as required to remove glaze.
 - 1. Determine alkalinity and moisture content of surfaces to be painted.
 - 2. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, neutralize before application of paint.
 - 3. Do not paint over surfaces where moisture content exceeds manufacturer's printed directions.
- F. Wood: Clean wood surfaces of dirt, oil, and other foreign substances; sandpaper smooth surfaces exposed to view and dust off.
 - 1. Scrape and clean seasoned knots and apply thin coat of recommended knot sealer, before application of priming coat.
 - 2. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job; prime edges, ends, faces, undersides, and backsides of wood.
 - 3. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood-filler; sandpaper smooth when dry.
- G. Ferrous Metals: Touch up shop-applied prime coats wherever damaged using same type of primer as applied in shop or barrier coat compatible with finish paint.
 - 1. Bare Surfaces: Clean surfaces that are not galvanized or shop-coated, of oil, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
 - 2. Galvanized Surfaces: Clean free of oil and surface contaminants, using non-petroleum-based solvent; primer and touch-up primer to be zinc-rich primer.
- H. Mix painting materials in accordance with manufacturer's directions.
- I. Store materials in tightly covered containers; maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- J. Stir materials before application to produce mixture of uniform density and stir as required during application; do not stir surface film into material, if necessary, strain material before using.

3.2 APPLICATION

- A. Apply paint in accordance with manufacturer's directions; use applicators and techniques best suited for substrate and type of material being applied.

1. Apply additional coats when stains or blemishes show through final coat, until paint is a uniform finish, color and appearance.
 2. Provide extra attention during application to assure dry film thickness at corners and crevices is equivalent to that of flat surfaces.
 3. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces; paint surfaces behind permanently fixed equipment and furniture with prime coat only.
 4. Finish doors on tops, bottoms and side edges same as faces.
 5. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 6. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 7. Sand lightly between coats when recommended by system manufacturer.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated or prepared for painting as soon as practicable after preparation.
1. Allow time between successive coatings to permit proper drying.
 2. Do not recoat until paint feels firm and does not deform or feel sticky under moderate thumb pressure.
- C. Minimum Coating Thickness: Apply materials at not less than manufacturer's recommended spreading rate, to establish a total dry film thickness as recommended by coating manufacturer.
- D. Prime Coats: Apply to items not previously primed; recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat.
- E. Finish Coats: Provide even texture; leave no laps, irregularity in texture, skid marks, or other surface imperfections.
1. Opaque Finishes: Provide opaque, uniform finish, color and coverage; cloudiness, spotting, holidays, brush marks, runs, sags, ropiness, and other surface imperfections are not acceptable.
 2. Transparent and Stained Finishes: Produce glass smooth surface film of even luster; provide with no cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, and other surface imperfections.
- F. Completed Work: Match approved samples for color, texture and coverage; remove, refinish or repaint work not accepted.

3.3 PAINTING SCHEDULE

A. Exterior Work: Provide following paint systems and sheens unless otherwise indicated.

1. Metal: Semigloss sheen.
 - a. 1st Coat: Touch-up primer, prime if none.
 - b. 2nd and 3rd Coat: Exterior 100% acrylic enamel.
2. Metal: High-performance coating specified in Section 09 96 70.
3. Concrete: Flat sheen.
 - a. 1st and 2nd Coat: Exterior acrylic latex emulsion.
4. Plaster: Flat sheen.
 - a. 1st and 2nd Coat: 100% Acrylic
5. Traffic Line Paint: Manufacturer's standard sheen; colors as required by line or symbol; blue for handicapped parking spaces.
 - a. 1st and 2nd Coat: Water based acrylic/epoxy traffic line paint; other systems subject to prior approval by Architect.

A. Interior Work: Provide following paint systems and sheens unless otherwise indicated.

1. Gypsum Board Systems: Eggshell (satin) sheen at walls, flat sheen at ceilings, semigloss sheen at toilet rooms.
 - a. 1st Coat: Universal primer.
 - b. 2nd and 3rd Coat: Interior latex or acrylic latex emulsion.
2. Metal: Semigloss sheen.
 - a. 1st Coat: Touch-up primer, prime if none.
 - b. 2nd and 3rd Coat: 100% acrylic enamel.
3. Concrete: Flat sheen.
 - a. 1st Coat: Primer sealer.
 - b. 2nd and 3rd Coat: Interior latex emulsion.
4. Plaster: Eggshell (satin) sheen at walls, flat sheen at ceilings, semigloss sheen at toilet rooms.
 - a. 1st Coat: Latex primer-sealer.
 - b. 2nd and 3rd Coat: Interior acrylic latex emulsion.
 - c. Add fungicidal agent to render fabric mildew proof.

B. Sheens: Comply with ASTM D523, reflectance of paint.

1. Flat: 1-10.
2. Satin: 15-30.
3. Eggshell: 30-45.
4. Semigloss: 45-75.
5. Gloss: 75-100.

3.2 CLEAN-UP, PROTECTION, AND REPAIR

- A. Clean-Up: During progress of work, remove discarded paint materials, rubbish, cans and rags from site at end of each workday.
 1. Clean glass and paint-spattered surfaces immediately by proper methods of washing and scraping, using care not to scratch or damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be painted or not; correct damage by cleaning, repairing or replacing, and repainting, as acceptable to Architect.
 1. Provide "Wet Paint" signs to protect newly painted finishes.
 2. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
- C. Repair: At completion of work of other trades, touch-up and restore damaged surfaces or defaced painted surfaces.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide general signage as indicated complete with attachment devices and accessories as required for complete installation.
- B. Related Sections:
 - 1. Section 09 90 00: Traffic line paint.
 - 2. Section 10 44 00: Fire extinguisher cabinet graphics.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature and indicate each sign type, style, color, and method of attachment.
- B. Shop Drawings: Furnish listing of sign types, lettering and locations, along with dimensions of each sign.
 - 1. Computerized Output: Furnish computerized samples of signs and graphics at full scale duplicating final appearance.
 - 2. Dimensional Letter Signs: Furnish complete shop drawings regarding fabrication and method of attachment of dimension letter signs.
 - 3. Photoluminescent Egress Path Signage: Submit complete shop drawings indicating locations of luminous egress path markings and signage.
- C. Samples: Furnish full size samples where requested.
- D. Certification: Furnish manufacturer certification that photoluminescent egress path markings and signage conform to California Building Code requirements.

1.3 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for adhesives.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Package separately or in like groups of names, labeled as to names enclosed; include installation template, attachment system and installation instructions.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. ASI Modulex, ASI Sign Systems, Inc.
- B. Mohawk Sign Systems.
- C. Vomar Products, Inc.
- D. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide signage as indicated with attachment devices and accessories.
- B. Regulatory Requirements: Provide signs for assuring access for persons with disabilities in accordance with state and federal regulations.
 - 1. California Regulations: Comply with California Building Code.
 - 2. Federal Regulations: Comply with Americans with Disabilities Act (ADA) Standards.
- C. Dimensional Letter Signage: Provide individual letter signs as indicated.
 - 1. Aluminum: Manufacturer's standard for individual letter signs.
 - a. Finish: Clear anodized finish, AA-M12C22A41, Class I, AAMA 607.1.
 - 2. Stainless Steel: ASTM A666, Type 304 nonmagnetic corrosion resistant stainless steel with No. 4 satin directional polish finish.
 - 3. Fabrication: Fabricate dimensional letters as indicated, of minimum 0.25" plate or casting with edges and corners smooth and finished to match adjacent metal finishes.
 - 4. Attachment: Secure letters using connections concealed after installation; method subject to Architect approval.
 - a. Take care back welding does not damage exposed sign surfaces.
- D. Toilet Room Door Signs: Provide door signs conforming to California requirements for signs for toilet rooms; concealed mounting system.
 - 1. Material, Plastic: Manufacturer's standard colored plastic/photopolymer signs.
 - a. Texture: Smooth.
 - b. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.

2. Material:
 - a. Aluminum: Manufacturer's standard for individual letter signs.
 - 1) Finish: Clear anodized finish, AA-M12C22A41, Class I, AAMA 607.1.
 - b. Stainless Steel: ASTM A666, Type 304 nonmagnetic corrosion resistant stainless steel with No. 4 satin directional polish finish.
3. Total Thickness: 0.25".
4. Provide signs required by California Code of Regulations Title 24.
 - a. Men's Room: 12" equilateral triangle, vertex pointing up.
 - b. Women's Room: 12" diameter circle.
 - c. Unisex Toilet: 12" diameter circle with equilateral triangle, vertex pointing up, superimposed on the circle; circle and triangle each 0.25" thick.
 - 1) Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
5. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
6. Symbols: As selected from manufacturer's standard symbols.
7. Adhesive: Type as recommended by sign manufacturer for type of substrate involved.
- E. Toilet Room Wall Signs: Provide signs conforming to California Building Code and ADA Standards for signs for permanent rooms, with inset symbols and with raised and Braille characters; concealed mounting system.
 1. Material, Plastic: Manufacturer's standard colored plastic/photopolymer signs.
 - a. Texture: Smooth.
 2. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 3. Material:
 - a. Aluminum: Manufacturer's standard for individual letter signs.
 - 1) Finish: Clear anodized finish, AA-M12C22A41, Class I, AAMA 607.1.
 - b. Stainless Steel: ASTM A666, Type 304 nonmagnetic corrosion resistant stainless steel with No. 4 satin directional polish finish.
 4. Comply with California Building Code and ADA Standards for raised and Braille characters, pictorial symbols, finish, and contrasts requirements.

- F. Entry Decals: Provide minimum 6" square decals with international handicapped symbol white on blue background with white border, applied to glass at accessible entry doors of existing buildings where all entry doors are not accessible.
- G. Porcelain Signs at Parking: Provide porcelain enamel on steel sign with beaded text and symbols meeting requirements of California Building Standards Code and with ADA Standards.
 - 1. At entry to parking provide state required sign indicating unauthorized vehicles parking in accessible parking spaces may be towed at owner's expense using exact wording required by CBC.
 - 2. Verify location and telephone number of location vehicle is to be towed with Owner; place this information as permanent part of sign wording.
 - 3. At parking spaces provide California required reflectorized sign, minimum 70 sq. inches, with symbol indicating accessibility.
 - 4. At van accessible parking spaces provide required "VAN PARKING" signs.
- H. Tactile Exit Door Signs: Provide colored plastic/photopolymer signs, conforming to California Building Code Section 1011.3 and ADA Standards for signs for permanent rooms, with tactile raised and Braille characters; concealed mounting system.
 - 1. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 - 2. Size and Style: As indicated on Drawings.
- I. Room Identification and Direction Signs: Provide signs conforming to California and ADA Standards for permanent signs, total thickness 0.125"; provide raised and Braille characters conforming to California and ADA Standards; concealed mounting.
 - 1. Material, Plastic: Manufacturer's standard colored plastic/photopolymer signs.
 - a. Texture: Smooth.
 - 2. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 - 3. Material:
 - a. Aluminum: Manufacturer's standard for individual letter signs.
 - 1) Finish: Clear anodized finish, AA-M12C22A41, Class I, AAMA 607.1.
 - b. Stainless Steel: ASTM A666, Type 304 nonmagnetic corrosion resistant stainless steel with No. 4 satin directional polish finish.
 - 4. Sizes and Styles: As indicated on Drawings, as directed by Architect where not otherwise indicated.

- J. Applied Copy Signs and Graphics: Letters and graphics as indicated on Drawings; Contractor option of silk-screen or vinyl applied.
 - 1. Silk-screen Signs and Graphics: Computer design screens for signs and graphics to designs and criteria established by Architect.
 - a. Silk-screen Lacquer: Match Advanced Screen Products/Industrial Gloss Lacquer Silk-screen Ink; colors as selected by Architect.
 - 2. Vinyl Signs and Graphics: Computer design vinyl signs and graphics to designs and criteria established by Architect.
 - a. Vinyl: Opaque non-reflective vinyl film, minimum 0.0035" thick, with pressure sensitive adhesive backing suitable for applications indicated; match 3M/Scotchcal Vinyl Film.
 - 3. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
- K. Tactile Emergency Evacuation Signs: Silk-screened polycarbonate with screening on back and with tactile and Braille information conforming to California requirements and ADA Standards.
 - 1. Information: Provide sign system with information as required by applicable authorities for emergency egress.
 - 2. Silk-Screen Colors:
 - a. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.
 - b. Silk-screen Lacquer: Match Advanced Screen Products/Industrial Gloss Lacquer Silk-screen Ink; colors as selected by Architect.
 - 3. Size and Style: As indicated on Drawings and acceptable to applicable authorities.
 - 4. Attachment: Method subject to Architect approval.
 - 5. Photoluminescent or Tritium self-luminous exit signs, where indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install signs in accordance with manufacturer recommendations and installation instructions, free from distortions and defects.

- B. Dimensional Letter Signage: Locate dimensional letters with spacing based on full-size computer-generated installation drawings secured to structure as required to resist anticipated loads.
 - 1. Final Location: As approved in field by Architect based on full size drawings.
- C. Toilet Room Door Signs: Install signs on doors after doors are painted and finished.
 - 1. Location: Mount signs with centerline of sign between 58" and 60" height as required by applicable code.
 - 2. Install centered and level, in line, in accordance with the manufacturer's recommendations.
 - 3. Clean and polish, remove excess adhesive.
- D. Toilet Room Wall Signs: Install signs on walls after surfaces on which they are to be mounted are painted and finished.
 - 1. Location: Mount signs at 48" to 60" height as required by applicable codes on strike side of door.
 - 2. Location: Mount signs with tactile characters 48" minimum (baseline of lowest Braille cells) and 60" maximum (baseline of highest line of raised characters) above finished floor and with on strike side of door for room identification signs as required by applicable codes, at heights indicated on details.
 - 3. Install level, in line, in accordance with California Building Code and ADA Standards to allow a person to approach within 3" of signs without being within a door swing and without encountering protruding objects.
 - 4. Clean and polish, remove excess adhesive.
- E. Entry Signs: Install in locations as approved by Architect.
- F. Stair Signs: Install signs inside stairwell after walls are finished, at locations immediately adjacent to door on strike side as required by referenced code, readily visible when door is open.
 - 1. Location: Mount signs at 48" to 60" height as required by applicable codes.
- G. Parking Signs: Provide mounting hardware, including painted posts, as needed; mount signs at heights required by state code.
 - 1. Install parking entry sign at location as directed by Architect.
- H. Tactile Exit Door Signs: Install at doors with lighted "EXIT" signs; apply after walls are finished.
 - 1. Location: Mount signs at 48" to 60" height as required by applicable codes on strike side of door.

2. Install level, in line, in accordance with the manufacturer's recommendations and ADA Standards to allow a person to approach within 3" of signs without being within a door swing and without encountering protruding objects.
 3. Clean and polish, remove excess adhesive.
- I. Room Identification and Direction Signs: Install signs after walls are finished.
1. Location: Mount signs at 48" to 60" height as required by applicable codes on strike side of door for room identification signs, where indicated for direction signs.
 2. Room Identification Signs Location: Mount signs with tactile characters 48" minimum (baseline of lowest Braille cells) and 60" maximum (baseline of highest line of raised characters) above finished floor and with on strike side of door for room identification signs and where indicated for directional signs.
 3. Install signs level, in line, in accordance with the manufacturer's recommendations, California Building Code and ADA Standards.
 4. Install room identification signs at doors to allow a person to approach within 3" of signs without being within a door swing and without encountering protruding objects.
 5. Clean and polish, remove excess adhesive.
- J. Applied Copy Signs and Graphics: Examine surfaces and construction for conditions adversely affecting installation, performance and quality of work.
1. Apply signage and graphics centered and level, in line, in accordance with manufacturer's recommendations.
- K. Emergency Evacuation Signs: Install signs after walls are finished.
1. Location: Mount signs at locations indicated, as directed by Architect and applicable authorities if not otherwise indicated.
 2. Install signs level and in accordance with the manufacturer's recommendations and requirements of applicable authorities.
 3. Clean and polish.
- L. Photoluminescent Egress Path Markings and Signage: Install exit path marking and signage as required by applicable codes.

END OF SECTION

SECTION 10 21 20

PHENOLIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide phenolic plastic partitions for toilet compartments including hardware, attachment devices, and integral accessories as required for complete installation.
- B. Related Sections:
 - 1. Section 10 28 00: Toilet accessories.

1.2 REFERENCES

- A. Americans with Disabilities Act (ADA) Standards.
- B. California Building Code: California Code of Regulations, Title 24, Part 2, requirements for providing accessibility for persons with disabilities.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's literature.
- B. Shop Drawings: Clearly indicate partition layouts, swing of doors, elevations, anchorage and mounting details, panel construction, hardware, finishes and relevant dimensions.
- C. Samples: Submit samples of metal finish.

1.4 QUALITY ASSURANCE

- A. Sustainability Requirements: Comply with CALGreen requirements including those relative to finish material pollution control for adhesives, sealants, and caulks.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Global Partitions, an ASI Group Company.
- B. Flush Metal Partition Corp.
- C. Bradley Corporation Mills Partitions. **(Basis of Design)**
- D. General Partitions Mfg. Corp.
- E. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide phenolic plastic partitions including hardware, attachment devices, and integral accessories.
 - 1. Toilet Compartment Type: Floor mounted, overhead braced.
- B. Regulatory Requirements, Access: Comply with California Building Code and Americans with Disabilities Act (ADA) Standards.
 - 1. Spacing: Provide minimum 60" clear width, and front space as applicable for type of compartment.
 - 2. Reinforcing: Provide reinforcing for grab bars indicated to be partition mounted.
- C. Regulatory Requirements, Fire Rating: Comply with requirements for fire ratings for interior finishes with either ASTM E84 or NFPA 286, Corner Burn Test as applicable.
- D. Phenolic Panels: Manufacturer's standard phenolic core with high pressure melamine color surface on faces, with exposed black phenolic edges burnished and slightly rounded.
 - 1. Color: ASI: charcoal
- E. Pilaster Shoes: 3" high; ASTM A666, Type 304, No. 4 polished finish; stainless steel.
- F. Attachments, Screws and Bolts: Stainless steel; tamper proof type; heavy duty extruded aluminum brackets.
- G. Hardware: Manufacturer's standard chrome plated or similar finish.
 - 1. Coat Hook/Bumper: Combination coat hook and bumper unit, maximum 48" above finished floor.
- H. Overhead Braced Partition Headrails: 1" by 1-5/8" tubular metal, with cast socket type wall brackets.
 - 1. Colors: Where color is not indicated on Drawings or Finish Schedule, provide custom color as directed by Architect.

2.3 FABRICATION

- A. Fabricate: Manufacturer's standard construction.
- B. Pilasters: 1-1/4" thick, constructed same as doors, of sizes required to suit cubicle widths and spacing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine site conditions to which work is to be applied.

- B. Take site dimensions affecting this work.
- C. Ensure correct spacing and size of plumbing fixtures; take special note of fixtures in compartments indicated to be designed for persons with disabilities to assure clearances complying with access regulations.
- D. Ensure correct location of built-in framing, anchorage, and bracing, where required.

3.2 INSTALLATION

- A. Install units in accordance with manufacturer recommendations and installation instructions, secure, plumb, level, and square.
- B. Leave 1/2" space between wall, panels and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to bracket with through sleeve tamper proof bolts and nuts.
- E. Locate headrail joints at pilaster center lines.
- F. Provide for adjustment of floor variations with screw jack through steel saddles integral with pilaster; conceal floor fastenings with stainless steel shoes.
- G. Adjust and align hardware to uniform clearance at vertical edges of doors not exceeding 3/16".
- H. Adjust hinges to locate doors in partial open position when unlatched, except adjust hinges to return doors to closed position at stalls designed for use by persons with disabilities.
- I. Anchor urinal screen panels to walls with either two panel brackets each or continuous angle brackets on both sides.

3.3 CLEANING

- A. Field touch-up of scratches and defaced finishes will not be permitted; replace damaged, scratched and marred defective materials with new, undamaged materials.
- B. Remove protective coverings and clean surfaces in accordance with manufacturer recommendations.

END OF SECTION

SECTION 10 26 10

STAINLESS STEEL CORNER GUARDS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide surface mounted stainless-steel corner guards, including mounting adhesive and accessories as required for complete finished installation.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's product literature.
- B. Samples: Furnish samples of finish.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. Babcock-Davis, Inc.
- B. In-Pro Corporation.
- C. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide surface mounted stainless-steel corner guards, including mounting adhesive and accessories.
- B. Corner Guard: ASTM A666, Type 304 stainless steel with satin finish; not less than 18-gage.
 - 1. Size: 3-1/2" by 3-1/2" by 48" high unless otherwise indicated.
- C. Attachment: Manufacturer's recommended adhesive for type of wall.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install stainless-steel corner guards in accordance with manufacturer's recommendations and installation instructions, straight and true to line.

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Provide semi-recessed cabinets for portable fire extinguishers with accessories as required for complete installation.

1. Fire Extinguishers: Owner furnished and installed.

- B. Related Sections:

1. Division 21: Fire protection systems.

1.2 SUBMITTALS

- A. Product Data: Furnish manufacturer's literature.

PART 2 - PRODUCTS

2.1 SYSTEMS MANUFACTURERS

- A. J.L. Industries.
- B. Larsen's Manufacturing Co.
- C. Potter Roemer.
- D. Substitutions: Refer to Section 01 25 00.

2.2 MATERIALS

- A. System Description: Provide semi-recessed cabinets for portable fire extinguishers with accessories.
- B. Fire Extinguisher Cabinets: Provide semi-recessed mounting unless otherwise indicated, maximum 4" extension beyond wall finish surface, provide trim suitable for installation indicated.
1. Type:
- a. J.L. Industries/Ambassador Series.
 - b. Larsen's Mfg. Co./Architectural Series.
 - c. Potter Roemer/Alta Series.
 - d. Substitutions: Refer to Section 01 25 00.
2. Typical Cabinet Depth: Provide cabinets designed for space available in walls with fire extinguisher cabinets, and of depth to house 2A-10BC multi-purpose dry chemical type fire extinguisher.

- 3. Food Preparation Areas: Provide cabinets designed to house K Type fire extinguisher at locations indicated on Drawings or designated as food preparation areas where burning grease could be encountered.
- 4. Hazardous Areas (Garage): Provide cabinets designed to house 4A-60BC multi-purpose dry chemical type fire extinguisher at locations indicated on Drawings or designated as hazardous.
- C. Trim: Manufacturer's standard edge trim for specified models.
- D. Metal Gages: Provide manufacturer's standard gages for cabinets specified.
 - 1. Surface Mounted Cabinets (Garage): Minimum 18-gage typical, 20-gage at back.
- E. Construction: Mitered and welded one-piece tubular door frames; weld joints and grind smooth; manufacturer's standard steel box with white baked enamel interior finish and primed exterior finish.
 - 1. Steel Doors and Trim: Manufacturer's standard, prime coat finished.
 - 2. Doors: Break-glass type secured access, with inside latch and lock.
 - 3. Door Hardware: Continuous hinge permitting door to open 180-degrees.
- F. Fire Rated Wall Construction: Provide fire extinguisher cabinet manufacturer's material as required to maintain integrity of fire rated partitions where cabinets are in fire rated partitions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine substrates and conditions under which fire extinguisher cabinets are to be installed.
- B. Do not proceed with work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cabinets in locations and at mounting height to comply with requirements of governing authorities; prepare recesses in walls as required.
- B. Securely fasten to structure, square and plumb, in accordance with manufacturer's instructions.
 - 1. Wherever exact location of units is not shown, locate as directed by Architect.

3.3 IDENTIFICATION

- A. After installation and finishing is completed, silk screen or apply decal letters spelling "FIRE EXTINGUISHER" as applicable.
- B. Letter size, style and location as selected by Architect.

END OF SECTION

SECTION 22 00 10

COMMON WORK FOR PLUMBING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Basic Plumbing Requirements specifically applicable to Division 22 Sections, in addition to Division 01 - General Requirements.

1.02 DESCRIPTION

- A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 WORK INCLUDED

- A. The complete Plumbing systems (including Fire Protection systems), including but not limited to these major items.
 - 1. Coordinate work of this Section with related trades.
 - 2. Verify applicable dimensions and location of existing utilities at the jobsite.
 - 3. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
 - 4. Soil waste and vent system inside and outside the building including connections to fixtures, equipment, sewer connections, clean-outs.
 - 5. Water piping systems inside and outside the building, including connections to fixtures, equipment, water meters and vaults; pressure regulating stations, backflow preventers.
 - 6. Plumbing fixtures, carriers, fittings, trim, hose bibs, wall hydrants, and accessories.

7. Installation and connection of Owner furnished equipment.
8. Shop drawings.
9. Equipment identification.
10. Equipment and systems adjustments and balancing.
11. Written operating and maintenance instructions.
12. Record drawings.
13. Guarantee

1.04 WORK SPECIFIED ELSEWHERE

- A. Concrete, Rough Carpentry, Joint Sealants, Sheet Metal, Flashing and Trim, access doors and Frames, Door Hardware, Paints and Coatings, Mechanical and Electrical.

1.05 SITE INSPECTION

- A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.06 ORDINANCES, REGULATIONS AND CODES

- A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.
 1. AFI - Air Filter Institute
 2. AMCA - Air Moving & Conditioning Association
 3. ARI - Air Conditioning & Refrigeration Institute

4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
5. ASME - American Society of Mechanical Engineers
6. ASTM - American Society of Testing Materials
7. AWS - American Welding Society Code
8. ANSI - American National Standards Institute
9. CBC - California Building Code
10. CCR - California Code of Regulations
11. CEC - California Electrical Code
12. CFC - California Fire Codes
13. CMC - California Mechanical Code
14. CPC - California Plumbing Code
15. FIA - Factory Insurance Association
16. NAFM - National Association of Fan Manufacturers
17. NEMA - National Electrical Manufacturer's Association
18. NFPA - National Fire Protection Association
19. ORS - Office of Regulatory Services
20. SCAQMD - South Coast Air Quality Management District
21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association

- 22. UFC - Uniform Fire Code
 - 23. UL - Underwriter's Laboratories
 - 24. UPC - Uniform Plumbing Code
- B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.
- C. Codes and Standards:
- 1. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).
 - 2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).
 - 3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).
 - 4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).
 - 5. National Fire Protection Associations - National Fire Code.
- D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.
- E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.
- F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.07 PERMITS, FEES AND INSPECTIONS

- A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.08 DRAWINGS AND SPECIFICATIONS

- A. The Architect's decision will be final on interpretation of the Drawings and Specifications.
- B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.
- C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.
- D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supersede the specification in the event of a conflict.
- E. Alternate support or seismic detail proposed by contractor shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.09 SUBMITTALS

- A. Before starting work, the Contractor shall furnish for the review of the Architect and Engineer. Provide Shop Drawings and Submittals with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.
- B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.
- C. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified.
- D. Submittals shall include, but not necessarily be limited to the following which are mandatory:

1. Draw Equipment Layouts to 1/4" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
3. Specialties, valves, gauges and thermometers of all types.
4. Foundations, supports, hangers, inserts.
5. Earthquake supports and calculations.
6. Insulation.
7. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
8. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades.
9. Automatic control system diagrams.
10. Access panels.
11. Clean-outs
12. Fixture carriers.
13. Hangers, inserts, supports, anchors.
14. Hose bibs.
15. Hot water circulators.
16. Pipe, fittings and specialties.
17. Pipe isolators.

18. Plumbing fixtures, fittings, trim, drains and receptors.
19. Pressure regulators.
20. Roof flashing.
21. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
22. Strainers
23. Water hammer arrestors.
24. Water heating equipment.
25. Expansion joints, guides and anchors.
26. Shop fabrications drawings and calculations.
27. Special and miscellaneous products furnished under this section and not listed herein.

1.10 RECORD DRAWINGS AND MANUALS

- A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.
- B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.
- C. Final Record Drawings: Conform to Division 1 requirements.
- D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

- E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.
- F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.
- G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:
 - 1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
 - 2. Specifications
 - 3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
 - 4. Grouting requirements.
 - 5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
 - 6. Start-up and beginning operation procedures.
 - 7. Operational procedures.
 - 8. Shutdown procedures.
 - 9. Maintenance and calibration procedures
 - 10. Parts lists
 - 11. Name, address and telephone number of each manufacturer's local representative.
- H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to

show the required review. When approved, deliver four copies to Architect unless otherwise specified.

- I. “As-Built” drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.11 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

- A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.12 INSULATION

- A. The insulation used for plumbing material shall comply with CBC section 720.
 1. Concealed Installation: Insulating materials, where concealed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.
 2. Exposed Installation: Insulating materials, where exposed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.
- B. Flexible elastomeric cellular insulation
 1. Manufacturer:
 - a. Aeroflex USA, Inc: www.aeroflexusa.com.
 - b. Armacell LLC: www.armacell.us.
 2. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.

- a. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
- b. Maximum Service Temperature: 220 degrees F (104 degrees C).
- c. Connection: Waterproof vapor barrier adhesive.

1.13 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

- 1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
- 2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
- 3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- 4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
- 5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

B. Copper Pipe Hangers:

- 1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
- 2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

1.14 THERMAL-HANGER SHIELD INSERTS

- A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig (862-kPa) minimum compressive strength and vapor barrier.
- B. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig (688-kPa), ASTM C 552, Type II cellular

glass with 100-psig (688-kPa) or ASTM C 591, Type VI, Grade 1
polyisocyanurate with 125-psig (862-kPa) minimum compressive strength.

- C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- E. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

1.15 SEISMIC DESIGN

- A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:
 - 1. In accordance with Title 24, 2022 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
 - 2. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical drawings. "Deferred Approval" items will not be permitted unless specifically approved by the plan check supervisor.
 - a. Exception: Attachments of equipment weighing less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds that is supported by vibration isolation devices suspended from the roof, wall or floor, need not

be detailed on the plans provided the following notes are included on the mechanical and electrical plans.

3. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2022 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.16 SUBSTITUTIONS AND CHANGES

- A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.
- B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.
- C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.
- D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.
- E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Division 01.

1.17 SUBMITTAL REVIEWS

- A. The Architect will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.18 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

- A. Immediately after award of the Contract and after the final review of submittals by the Architect and / or Engineer, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time to meet construction schedule. The contractor shall deliver to the

Architect and Owner a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.19 LOCATIONS AND ACCESSIBILITY

- A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as reviewed by Architect and / or Engineer. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.
- B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.
- C. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.
- D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.
- E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.
- F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.
- G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.20 COORDINATION OF TRADES

- A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.
- B. No extras will be allowed for changes made necessary by interference or coordination between trades.
- C. Submit Composite Coordination Drawings in accordance with Special Conditions. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Coordination Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have

competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Division 01. Do not start installation of work involved under Composite Coordination Drawings until the Architect and Engineer reviews applicable submittal. Discrepancies between the Drawings and Composite Coordination Drawings shall be specifically noted and identified on the Composite Coordination Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Coordination Drawings.

- 1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.
- 2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
- 3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
- 4. Concrete: Conform to Concrete Section of the Specifications.

1.21 GUARANTEES

- A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other

damage caused to the building free of charge to the Owner, including cost of labor and materials.

- B. Guarantee included in this section to cover:
 - 1. Faulty or inadequate design of equipment or material installed
 - 2. Improper assembly or erection
 - 3. Defective workmanship or material
 - 4. Incorrect or inadequate operation or other failure
- C. The Contractor shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise
- D. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period
- E. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.
- F. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty and proof of shipment date or purchase date per terms of warranty to the Owner, who shall be named as beneficiary.

1.22 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.23 CLOSING-IN OF UNINSPECTED WORK

- A. Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up

or enclosed before such inspection and test, shall at their own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.24 BUILDING FOOTING CLEARANCES

- A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.25 DAMAGE BY LEAKS

- A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.26 EQUIPMENT LABELS

- A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.27 PRELIMINARY OPERATION

- A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.28 MAINTAINING EXISTING SERVICES

- A. The premises and existing building at the site will be in use at the time the work of this Section is in progress. Contractor shall conduct his work so as to cause no inconvenience or danger to the personnel on the premises.
- B. He shall maintain continuity of service to the existing mechanical systems, except for designated intervals during which connections can be made. The scheduling of the shut down period shall be at a time directed by the Architect.

- C. In some instances, it may be necessary to defer work in certain areas and locations until such time as existing facilities can be relocated or rearranged by the Owner. Therefore, whenever it becomes necessary for the Contractor to perform work under this contract in areas in which the Owner's work is being performed. This contractor shall advise the Architect relative to this requirement and shall follow closely the directive issued by

the Architect insofar as time and procedure are concerned. Allow Owner 72 hours prior notice.

- D. This contractor shall include in his bid all premium time to which he may be subjected for performing work in such procedure and at such time as may be necessary to cause the least interference with the function of the Owner.

1.29 ELECTRICAL WORK

- A. Coordinate with Division 26 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.
- B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.
- C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.
- D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.
- E. All interconnecting power wiring and conduits shall be provided by Division 26.
- F. Control wiring shall be provided by Division 22, unless otherwise indicated on the drawings.
- G. Conduit for control wiring shall be provided by Division 26

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Sinks.
- B. Under-lavatory pipe supply covers.
- C. Note: Refer to drawings for mop sink faucet and water hammer arrester specifications.

1.02 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures 2011 (Reaffirmed 2017).
- C. ANSI Z124.2 - American National Standard for Plastic Shower Units; 1995.
- D. ANSI Z358.1 - American National Standard for Emergency Eyewash and Shower Equipment 2014.
- E. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use 1997 (Reaffirmed 2017).
- F. ASME A112.18.1 - Plumbing Supply Fittings 2018.
- G. ASME A112.19.1M - Enameled Cast Iron Plumbing Fixtures; The American Society of Mechanical Engineers; 2008 (R2011).
- H. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018.
- I. ASME A112.19.3 - Stainless Steel Plumbing Fixtures 2017.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2019b.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- L. NSF 61 - Drinking Water System Components - Health Effects 2019.
- M. NSF 372 - Drinking Water System Components - Lead Content 2016.

1.03 SUBMITTALS

- A. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

- B. Maintenance Data: Include fixture trim exploded view and replacement parts lists.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 MOP SINK

- A. Sink Manufacturers:
 - 1. KOHLER
- B. Single Compartment Bowl:
 - 1. ASME A112.19.3; 18.5" x 18.5" x 9" in outside dimensions, 19 gage thick, Type 304 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
 - a. Drain: 1-1/2 inch (38 mm) chromed brass drain.
- C. Accessories: Chrome plated 17 gage (1.3 mm) brass P-trap with clean-out plug and arm with escutcheon, wheel handle stop, rigid supplies.

2.03 UNDER-LAVATORY PIPE SUPPLY COVERS

- A. Manufacturers:
 - 1. Plumberex Specialty Products, Inc; www.plumberex.com.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. General:
 - 1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
 - 2. Construction: 1/8 inch (3.2 mm) PVC with antimicrobial, antifungal and UV resistant properties.

- a. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
- b. Comply with ICC A117.1.
- 3. Color: High gloss white.
- 4. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.
- C. Confirm that millwork is constructed with adequate provision for the installation of countertop lavatories and sinks.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key or integral stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Review millwork shop drawings. Confirm location and size of fixtures, valves, cleanouts and openings before rough-in and installation.

3.05 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

- A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.

- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

PART 4 – PLUMBING FIXTURES

- A. Plumbing fixtures and accessories provided in a toilet room or bathing room required to comply with CBC Section 11B-213.2 shall comply with CBC Section 11B-213.3.
- B. Effective March 1, 2017, all single-user toilet facilities shall be identified as Gender Neutral facilities by a door symbol that complies with CBC Sections 11B-216.8 and 11B-703.7.2.6.3.

No pictogram, text or braille is required on the symbol. If tactile jamb signage is provided, the signage shall comply with the appropriate technical requirements of CBC Section 118-703.

Examples of appropriate designations are *ALL-GENDER RESTROOM". "RESTROOM" or "UNISEX RESTROOM". DSA BU 17-01.
- C. Accessible plumbing fixtures shall comply with all the requirements in CBC Chapter 11B, Division 6.
- D. Clearance around accessible water closets and in toilet compartments shall be 60 inches minimum measured perpendicular from the side wall and 56 inches minimum measured perpendicular from the rear wall per CBC Section 11B-604.3.1.
- E. Heights and location of all accessible plumbing fixtures and components shall be mounted according to CBC Sections 11B-602 through 11B-612
- F. Accessible fixture controls shall comply with CBC Sections 11B-602.3 for drinking fountains, 11B-604.6 for water closets, 11B-604.9.5 for children's water closets, 11B-605.4 for urinals, 11B-606.4 for lavatories and sinks, 11B-607.5 for bathtubs, 11B-608.5 for showers, and 11B-611.3 for washing machines and clothes dryers.
- G. Accessible lavatories and sinks shall be mounted with the front of the higher of the rim or counter surface 34" maximum above the finish floor or ground. Depth of lavatories or sinks shall not interfere with knee and toe clearance provided in accordance with CBC Section 11B-306 when a forward approach is required. CBC Sections 11B-606.3 and 11B-606.7

END OF SECTION

SECTION 23 05 00

COMMON WORK FOR MECHANICAL

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The Work under this Section includes, but is not limited to, providing all labor, material, equipment, and services necessary for completion of all mechanical systems in a serviceable fully operational manner.
- B. All items of Work and systems shall be furnished and installed ready for satisfactory operation and all required apparatus and service shall be provided even though not specifically mentioned herein.
- C. The Contract Specifications and Contract Drawing Equipment Schedules list the equipment manufacturers selected for the basis of the Specifications and for the various individual equipment layouts on the Contract Drawings. Substitutions shall be made in accordance with General Conditions and as otherwise provided in the Contract Documents.
- D. The Drawings showing the layout, arrangements, sizes and principal connections to the equipment and apparatus are based on one equipment of an acceptable manufacturer. If equipment other than the type shown on the layout Drawings is used, it is the Contractor's sole responsibility to make all necessary modifications to related piping, ductwork, electrical and utility connections, apparatus, and miscellaneous items to complete the Mechanical Work, ready for satisfactory operation required under these Specifications. The cost of making all the modifications shall be borne by this Contractor without extra cost to the Owner, Architect or Engineer. In using such equipment, it is imperative that the equipment must fit the space and the access allotted, with the final layout to be approved by the Architect/Engineer (A/E). Follow the Drawings as closely as actual building construction permits.
- E. The Drawings show the principal engineering design elements of the mechanical installation. They are not intended as detailed construction installation drawings for the Mechanical Work but as a complement to the Specifications to clarify the principal features of the mechanical systems. It is the intent of this Section that all equipment and devices, furnished and installed under this and other Sections, be properly connected and interconnected with other equipment to render the installation complete for successful operation, regardless of whether all the

connections and interconnections are specifically mentioned in the Contract Specifications or shown on the Contract Drawings.

- F. Check the layout of the Work of this Division, as indicated on the Drawings. Determine exact locations by the dimensions of the equipment approved. Obtain written approval from the Engineer for any revised layout before equipment or material involved is installed. Consult the Architectural and Structural Drawings for all dimensions, locations of partitions, locations and sizes of structural supports, foundations, swings of door, and other detail information required for a correct installation of this Work.
- G. Examine all other Divisions of the Contract Documents for Work related to the Work of this Division. Cooperate to provide continuity of Work, to eliminate duplications, and to provide Mechanical Work in support of such related Work. Furnish to other trades and on schedule all information required for the execution of Mechanical Work.
- H. Any additional Work such as cutting, drilling, patching, excavating, moving of another trade's work because of delay in Mechanical Work or lack of information is a part of this Division and shall be performed without increase in Contract Price.
- I. Install and connect devices and equipment in accordance with the best engineering practice and the manufacturer's instructions and recommendations. Provide all incidental ductwork, piping, valves, connections, and all similar material recommended by the manufacturer, or required for proper operation and maintenance, complete without additional costs.
- J. Provide all necessary rigging, scaffolding, tools, tackle, labor and other materials or equipment which may be necessary for the completion of the Work.
- K. Furnish and install motor on proper frame designed by the driven equipment manufacturer.
- L. All control wiring associated with the mechanical systems shall be provided under Division 23. All wiring shall comply with Division 26 Standards.

1.2 SPECIFIED ELSEWHERE

- A. The following will be provided under other sections of the Specifications:
 - 1. Openings: Walls, floor, ceiling, and roof opening specifically shown and identified on the Architectural/Structural Drawings will be provided

under other Divisions. Openings not so identified that are required for Mechanical Work, or changes to such openings are part of the Work of this Mechanical Division.

2. Curbs, Drains and Sleeves: Drains and roof sleeves provided under this Division shall be incorporated into the finished roofing and made watertight under another Division.
3. Equipment Bases: Concrete equipment bases, mounting slabs, and housekeeping pads specifically shown and identified on the Mechanical Drawings shall be provided under this Division. Supervise their installation. Those bases, not so identified and indicated on the Architectural and Structural Drawings, shall be provided under other Divisions. Cooperate and furnish dimensions, sleeves, inserts, hold-down bolts, and templates for their installation.
4. Painting: Painting of all exposed-to-view pipes, ducts, hangers, supports, and equipment, shall be performed under another Division. Under this Division, all manufactured equipment shall be furnished with factory-finished baked enamel, unless otherwise specified.
5. All power wiring associated with equipment provided under this Division shall be furnished, installed, and wired in accordance with Division 26. Under Division 23, provide installation instructions, locating dimensions, and wiring diagrams for the other trades. Supervise the installation and start-up and test the equipment.

1.3 RELATED WORK

- A. The Drawings, General Provisions of the Contract, General Conditions, General Requirements, Supplemental General Conditions and Division 1 through 26 all apply to the work in this Section.

1.4 DEFINITIONS

- A. Provide: Furnish, install, and connect complete and ready for operation of particular work referred to, unless specifically otherwise noted.
- B. Furnish: To purchase, procure, acquire, and deliver complete with related accessories.
- C. Install: To erect, mount and connect for use complete with related accessories.
- D. Work: Labor, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.

- E. Concealed: Embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces or in enclosures.
- F. Exposed: Not installed underground or concealed as defined above.
- G. Accessible: Capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, ductwork or going through doors or false ceilings.
- H. Words: Words used in the singular number shall include the plural sense and vice versa.
- I. Wiring: Wire or cable installed in conduit, with all required boxes, fittings, supports, connections, etc.
- J. Power Wiring: That wiring between the source of power and the current consuming device such as motors, equipment, heaters, etc. It includes the installation of such control devices in the power circuit such as pushbuttons, thermostats, key switches, timers, etc., which control loads for which no magnetic starter or contactor is provided for controls.
- K. Control Wiring: That wiring between control devices that does not provide the power circuit, regardless of voltage, when a magnetic starter or contactor is provided for control.

1.5 INTENT

- A. Furnish, erect, install, connect, clean, adjust, test and place in service all materials, equipment and systems in accordance with applicable codes, manufacturer's directions and recommendations for all work shown on the drawings and called for in the Specifications.
- B. Carefully examine the contract documents, visit the site, and thoroughly become familiar with the local conditions relating to the work. Failure to do so will not relieve the contractor from any obligations of the Contract.
- C. Should there be any discrepancies of a question of intent, refer the matter to the Architect/Engineer for a final decision before ordering any equipment/materials or before starting any related work.

- D. In case of conflict between project specifications and drawings, project specifications govern unless the Architect/Engineer rules otherwise.
- E. Apparatus, devices, materials of work not specifically shown on drawings, but mentioned in the project specifications, or vice versa, or any incidental accessories and appurtenances necessary to make the work complete and ready for operation, even though not specified or shown on the drawings, shall be furnished and installed without additional expense to the Owner.
- F. It is the contractor's responsibility prior to bids to review all project documents. Project documents include architectural, structural, mechanical, control, plumbing, fire protection and electrical disciplines.

1.6 CODES AND STANDARDS

- A. Applicable Publications: Reference made herein to standards, Specifications, or codes, refer to the latest edition including all addenda, errata, or other revisions thereto, existing on the date of execution of the Contract.
- B. Local Codes and Ordinances: Install all Work in conformance with all applicable local Codes and state ordinances and statues. Nothing in the Specifications or Drawings shall be construed to permit deviation from the governing codes. In case of conflict with local ordinances and statues, the more stringent shall apply.
- C. Abbreviations: Refer to Division 1, Abbreviations and Symbols under Mechanical Sections make use of the following abbreviations in adopting applicable standards and codes as a part of Division 23:
 - 1. ADC - Air Diffusion Council - Test Code
 - 2. AGA - American Gas Association
 - 3. AIA – American Institute of Architects
 - 4. AMCA - Air Moving and Conditioning Association
 - 5. ANSI - American National Standards Institute
 - 6. API - American Petroleum Institute
 - 7. ARI - Air Conditioning and Refrigeration Institute
 - 8. AGA - American Gas Association
 - 9. ASHRAE–American Society of Heating, Refrigeration and Air Conditioning Engineers
 - 10. ASME - American Society of Mechanical Engineers
 - 11. ASTM - American Society for Testing and Materials
 - 12. AWS - American Welding Society
 - 13. AWWA - American Water Works Association

14. EPA - Environmental Protection Agency
15. FM - Factory Mutual System
16. IMC – International Building Code
17. IPC – International Plumbing Code
18. IRI - Industrial Risk Insurers
19. MSS - Manufacturers Standardization Society
20. NACE – National Association of Corrosion Engineers
21. NEC - National Electric Code
22. NEMA - National Electrical Manufacturers Association
23. NFC - National Fire Code
24. NFPA - National Fire Protection Association
25. NPC - National Plumbing Code
26. NSF – National Sanitation Foundation
27. OSHA - Occupational Safety and Health Standards
28. PDI – Plumbing and Drainage Institute
29. SMACNA - Sheet Metal and Air Conditioning Contractor's National Association
30. UL - Underwriters Laboratories, Inc.
31. UBC – Uniform Building Code
32. State and Local Fire Marshall
33. State and Local Inspection Authorities
34. Owner District's Fire Insurance Agency requirements
35. The Division 1 Sections "Regulatory Requirements" and Reference Standards of the Project Specifications

D. Permits and Inspections:

1. Obtain and pay for all permits, bonds, licenses, etc. required by the Local, State or other authority having jurisdiction over the work.
2. Arrange and pay for inspections required by the above when they become due as a part of the work of the Sections affected. Conceal no work until approved by these governing authorities. Present the Owner with properly signed certificates of final inspection before the Owner's acceptance of the Work.
3. Obtain and pay for all meters, gauges, instruments, and devices required by the governing authorities except as otherwise noted as part of the Work of the Sections affected.

1.7 QUALITY ASSURANCE

- A. All materials furnished shall be new and shall comply with all applicable standards listed below.

- B. All materials or work found to be defective or not in strict conformity with the Contract Documents, or defaced or injured through any cause, shall be rejected and shall be removed by Contractor and satisfactory material and Work substituted without delay.
- C. Contractor shall protect his/her Work by keeping all piping, equipment, etc., capped or plugged, drained, or otherwise protected from injury by freezing, water damage, or stoppage from material, concrete, sand, or dirt and shall repair any such injury without additional charge to the User. Injury shall be interpreted to include scratches, discoloring and denting.
- D. Contractor will be held responsible for any damage caused by him/her to other Contractors' Work.
- E. Submit shop drawings and product data for all equipment as specified or scheduled. Update all drawings to "as-built" status on CD-Rom and submit to Architect/Engineer.

1.8 SPECIFICATIONS AND DRAWINGS

- A. These specifications and Drawings are intended to describe and provide for a complete and finished project. They are intended to be complementary. All items of work called for by either shall be as binding as if called for by both. The work described shall be complete in every detail, notwithstanding the fact that every item necessarily involved is not particularly mentioned or shown. If the Bidder, Supplier or Contractor sees anything to question, it must be brought to the attention of the A/E immediately.
- B. Minor Deviations: The Drawings accompanying these Specifications indicate the general design and arrangement of equipment, apparatus, fixtures, accessories and piping necessary to complete the installation of the system. The exact location or arrangement of the apparatus and equipment, unless otherwise dimensioned, is subject to minor changes necessitated by field conditions and shall be required without additional cost to the Owner. Measurements shall be verified through actual observation at the construction site. Each Trade Contractor shall be responsible for fitting all his work into place in a satisfactory and workmanlike manner, to the approval of the A/E and Owner.
- C. Provide all labor and materials necessary for the completion of the work described. Referenced codes and industry standards and methods shall apply when no other specifics are indicated. Bring questions relating to this paragraph to the attention of the A/E for resolution prior to the receipt of Bids.

- D. All Work indicated on Drawings, diagrams, or details in part only are to continue throughout unless distinctly marked otherwise. The same applies to other parts of the project where merely a typical reference plan, diagram, or section of the drawing is complete. The balance is intended to be the same as the typical plan, section, or diagram as shown and is to be figured accordingly.
- E. The specifications are divided into trades and divisions only for the distinct purpose of facilitating the work. However, the Trade Contractor will become responsible for furnishing all labor and materials necessary to complete the project as contemplated by the Drawings and Specifications. Any item mentioned under any heading of the Specifications must be supplied even though it is not called for again under the heading for the respective work.
- F. Should discrepancies occur within the Contract Documents, the more stringent and more costly approach shall apply for bidding purposes. The Contractor is to notify the A/E of discrepancies for clarification. Clarifications issued after the Contract is awarded shall be incorporated by the Contractor at no additional costs and shall be reviewed by the A/E to determine if a reduction in cost is justified.

1.9 SUBSTITUTIONS

- A. Product substitutions shall be in accordance with the General Conditions, Supplemental General Conditions, Division 1 and as specified.
- B. The products, equipment, etc. scheduled on the Drawings or specified are the basis of design. Where more than one manufacturer is listed, the Contractor may use any of the acceptable manufacturers as the basis of their bids unless otherwise specified. However, the Contractor assumes all responsibility for changes to the design, installation, etc. because of the change, i.e.: power characteristics, physical size, etc.
- C. Any request for substitution to other than the specified acceptable manufacturers must be submitted to the Engineer in writing and shall include an adequate description of proposed change, reason(s) for requesting change and cost adjustment information. Substitutions not submitted in this manner will be rejected automatically. Substitution requests will only be considered for the following reasons:
 - 1. Specified manufacturer(s) is no longer in business.
 - 2. Specified product(s) cannot be delivered within the required project schedule.
 - 3. Alternate product(s) is of equal quality, but better value with savings offered to the Owner.

1.10 PROJECT RECORD DOCUMENTS

- A. Maintain Project Record Drawings during construction in accordance with General Conditions and as specified.
- B. Provide Project Record Drawings at completion of project. Shop drawings are not acceptable as record drawings unless they have been revised to reflect all field changes. Tracing or reproduction of the Contract Documents shall not be acceptable.
- C. Show the following information on the Project Record Drawings:
 - 1. All significant changes in plan, sections, elevations, and details, such as all relocation, or changes in ductwork and piping.
 - 2. All final locations of controls and final arrangement of electric circuits and any significant changes made in design because of change order or job conditions.
 - 3. Final location and arrangement of all mechanical equipment.
- D. Provide AutoCAD Version 2007 or later files on diskette or CD-Rom of all Project Record Drawings.

1.11 OPERATING AND MAINTENANCE MANUALS

- A. Submittals of operation and maintenance manuals shall be in accordance with General Conditions and as herein specified.
- B. Prepare and deliver to the Engineer, three (3) complete sets of operating and maintenance manuals for all equipment listed in the Equipment Schedules and when specified by the Section in which the equipment is furnished. Provide all information pertinent to the equipment for preventive maintenance and for replacement of all expendable components. Manuals shall refer only to the actual equipment provided. All reference to alternative equipment shall be deleted. All such literature shall be bound in three (3) new standard 3-ring binders and shall be submitted to the Engineer, along with an electronic (PDF) version.
- C. Include the items listed below and features as may be recommended by the manufacturers.
 - 1. Catalog information of the unit installed.
 - 2. Capacity and installation details.
 - 3. Wiring diagrams of electrical components.

4. Special valves and control devices.
 5. Complete list of parts with reordering numbers.
 6. All points requiring lubrication, lubrication frequency and type of lubricant.
 7. Operating pressure and temperatures.
 8. Design pressures and temperatures.
 9. Relief devices and settings.
 10. Electrical characteristics of all motors.
 11. Operating curves of pumps and fans.
 12. Recommended spare parts list.
- D. Prepare operating instructions, complete and explicit, including instructions for start-up, operating, and stopping. Underscore and emphasize critical points of operations and hazardous limit.
- E. Items which also must be included are make-up air units, coils, filters, unit heaters, heating and HVAC components, fans, motors, pumps, temperature control systems with a description of the sequence control, vibration isolation, etc.
- F. Include flow charts and wiring programs in the manuals indicating valve locations and control devices. Also include parts lists to be used for ordering replacement and repair parts.
- G. Arrange information in an orderly manner in accordance with the numbering system used for the project specification. Include a table of contents for each manual.
- H. Manual covers shall include the name of the project.

1.12 DELIVERY, STORAGE AND HANDLING

- A. Refer to the General Conditions, Standard Specifications and as specified in each individual section.

1.13 WARRANTY

- A. Except where otherwise specifically included in individual Sections, all mechanical systems shall be provided with the guarantees as follows.
- B. Guarantee all mechanical systems, equipment, materials, and workmanship to be free from defect for a period of 1 year from the date of final acceptance of

the Work. Replace or repair in an approved manner any Work which may prove defective or not in compliance with the Contract Documents without additional cost to the Owner and without interference with the Owner's operation. There shall be a mandatory walk thru at 10 months to ensure all equipment/materials are performing as required.

- C. Deliver to the Architect/Engineer two (2) copies of all manufacturer's or equipment suppliers' warranties before final acceptance of the work.
- D. Make all adjustments required to ensure operation of the various systems in accordance with the intent of the Drawings and Specifications.
- E. It is specifically understood that all adjustments to ensure the proper operation of the systems shall cover a period of 12 months following acceptance of the Work, and the Contractors and/or their suppliers shall make all such adjustments required during this period without delay and without additional cost to the Owner.

1.14 TESTING, ADJUSTING AND BALANCING

- A. This contractor shall employ services of an independent firm to perform testing, adjusting and balancing.
- B. The independent firm will perform services specified in related section.
- C. Reports will be submitted by the independent firm to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.
- D. Test Pressures: Lines shall be tested according to the following schedule:

Line	Test Medium	Minimum Pressure	Minimum Time	Remarks
Condensate	Water	125 lb.	24 Hours	No Drop

1.15 OPERATING INSTRUCTIONS TO OWNER

- A. Contractor shall furnish Architect/Engineer with a written statement from the Owner certifying acceptance of all the equipment, data and instructions of operation. Architect/Engineer will not approve the request for final payment until this certificate has been submitted.

PART 2 - PRODUCTS

2.1 EQUIPMENT SUPPLIED BY CONTRACTOR

- A. Contractor furnishing an item of equipment is responsible for the proper handling, setting, installation, start-up, and initial operation.
- B. If Contractor is unfamiliar with the proper start-up and adjustment procedure of any equipment or system furnished by him/her, he/she shall include the services of a qualified representative of the manufacturer or vendor to provide start-up assistance and for instruction of the Owner's personnel.
- C. Contractor shall include all necessary allowances to ensure that all equipment and systems furnished will be serviced as required during the guarantee period.
- D. When a manufacturer offers an extended warranty at additional cost, such extended warranty shall be included as alternate.

2.2 NOISE AND VIBRATION CONTROL

- A. Contractor shall make provisions in the installation of the Work that noises or vibrations will not be transmitted through foundations, floors, walls, columns, ducts and piping, so as to be objectionable in any manner. All equipment provided shall be selected and installed with this in view. If any equipment exceeds reasonable requirements as to quietness of operation and freedom from vibration when operating under continuous maximum demands, it shall be altered or replaced.
- B. Furnish and install vibration eliminators and isolation equipment for equipment, motors, and pumps, as indicated on the Drawings, and as specified in related section.
- C. The isolation and vibration eliminator manufacturer and Contractor shall be responsible for the selection of the proper units for their loadings, quantities, and each shall guarantee that every installation and their application shall have a vibration efficiency of 95% or greater. As a minimum, provide types of vibration eliminators as indicated on the Drawings and specified in related section.
- D. Submit shop drawings to the Architect/Engineer for review of all isolation equipment with dimensions and other data as recommended and prepared by the isolation equipment manufacturer.

2.3 GUARDS

- A. All belts, pulleys, chains, gears, couplings, projecting set screws, key and other rotating parts shall be fully enclosed and properly guarded.
- B. Guards shall be constructed of not less than 1" x 1" x 1/8" structural steel angles and 1/2-inch diamond mesh enclosure or equally suitable enclosure, all of hot-dipped galvanized fabrication.
- C. Guards shall be secured to the driven machines or to foundations of floors by heavy galvanized structural angle supports and anchor bolts. Braces or supports secured to motors will not be permitted and braces and/or supports must not "bridge" the sound and vibration isolators.
- D. Guards shall be designed with adequate provision for movement of motor required to adjust belt tension. Means shall also be provided to permit lubrication, use of speed counters and other maintenance and testing operation with guard in place.

2.4 MAINTENANCE MATERIALS, SERVICE AND SPARE PARTS

- A. This contractor shall be responsible for continued maintenance of all equipment furnished under this contract. This contractor shall, at the time of owner acceptance, provide the Facilities planning Office with a report detailing the following information:
 - 1. Dates equipment arrived at the job site.
 - 2. Installation date.
 - 3. Dates of maintenance at start-up and at periodic maintenance.
 - 4. Dates of lubrication changes as applicable and specific name, manufacturer and type of lubrication.
- B. Refer to the General Conditions and to the individual Sections for additional requirements.

2.5 DUCTWORK – SINGLE WALL RECTANGULAR AND ROUND

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
 - 1. Construct ducts of galvanized sheet steel unless otherwise indicated.
- B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct

Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- E. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections. See "Sheet Metal Materials" Article in the Evaluations for discussion on applicable materials and coatings in "Galvanized Sheet Steel"; "PVC-Coated, Galvanized Sheet Steel"; "Carbon-Steel Sheets"; "Stainless-Steel Sheets"; and "Aluminum Sheets" paragraphs below. Galvanized Sheet Steel: Comply with ASTM A653/A653M.
- F. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C534/C534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - 2. Aeroflex USA, Inc.
 - 3. Armacell LLC.
 - 4. Ductmate Industries, Inc.
 - 5. K-Flex USA; K-FLEX Duct Liner Gray
- G. The insulation used for ducts shall comply with CBC section 720.
 - 1. Concealed Installation: Insulating materials, where concealed as installed

- in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.
2. Exposed Installation: Insulating materials, where exposed as installed in buildings of any type of construction, shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 450.

2.6 SPLIT SYSTEM

- A. Concealed Evaporator-Fan Components:
 - a. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 - b. Insulation: Faced, glass-fiber duct liner.
 - c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.

Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.

- a. Fan Motors:
 1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 2. Multitapped, multispeed with internal thermal protection and permanent lubrication.
 3. Wiring Terminations: Connect motor to chassis wiring with plug connection.
1. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
2. Filters: Permanent, cleanable.
3. Condensate Drain Pans:
 - i. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.
 1. Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1
 2. Depth: A minimum of 1 Inch.
 3. steel sheet.
 - ii. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end of pan.

- iii. Minimum Connection Size: $\frac{3}{4}$ " Inch. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
- D. Air-Cooled, Compressor-Condenser Components:
 - a. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 - b. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - i. Compressor Type: Scroll.
 - i. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - i. Refrigerant: R-407C or R-410A
 - ii. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.
 - a. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
 - b. Fan: Aluminum-propeller type, directly connected to motor.
 - c. Motor: Permanently lubricated, with integral thermal-overload protection.
 - d. Low Ambient Kit: Permits operation down to 45 deg F.
 - i. Mounting Base: Polyethylene

PART 3 – EXECUTION

3.1 SAFETY PRECAUTIONS DURING INSTALLATION

- A. Contractor shall take all measures to ensure safe installation of all Work and to prevent injury to persons or damage to property in compliance with OSHA and all applicable regulations.
- B. Contractor shall erect whatever scaffolds, platforms, supports, or other required construction to safely protect his/her own workers and other persons at the site.
- C. Such scaffolds, platforms, etc., shall be designed and constructed by Contractor who shall be solely responsible for their adequacy and safety. Engineer, Architect, Owner, or User is not responsible for ascertaining the adequacy of any temporary structures used or erected by the Contractor.

3.2 INTERRUPTIONS AND TIE-INS

- A. Any interruptions and tie-ins to existing systems that are necessary for installation of the new Work shall be performed and completed in coordination with the Owner's representatives. Provide 2 days written notice prior to any tie-in or connection to existing active systems. Any work requiring shut down of systems serving occupied areas shall occur during off hours, unless otherwise scheduled by mutual agreement.

3.3 MODIFICATIONS AND INTERFERENCES

- A. Contractor shall carefully check and become familiar with the Architectural, Structural, Electrical and all Mechanical Drawings and Details and make note of all locations where walls, partitions, ceilings, and structural members are called for to be furred or closed in.
- B. Modifications to the arrangement of the piping and ductwork systems may be required to suit structural conditions, or to avoid interference with the Work of other trades. Contractor shall furnish all offsets, additional fittings, etc., as required to meet installation conditions whether detailed on the Drawings or not.
- C. Any conflicting information in the Specifications or on the Drawings shall be called to the attention of the Architect/Engineer for clarification before proceeding with fabrication or erection of the parts affected.

3.4 COOPERATION OF CONTRACTORS

- A. Each Contractor, in the event of separate contracts in laying out his/her work, shall cooperate with other Contractors on the work to avoid any interference with their work. If this is not done, the Architect/Engineer reserves the right to make such changes in the work as are necessary to avoid interferences and such changes will not be considered as cause for additional compensation or extension of time for the Contractor.

3.5 WORK PRIORITY OVER OTHER TRADES

- A. Work in cooperation with one another to fit piping and ductwork into structure as job conditions may demand. All final decisions as to right of way and run of pipe, ducts, to be made by the Architect/Engineer. In general, priority is to be arranged as follows:

1. Recessed lighting fixtures
2. Sheet metal ductwork
3. Sprinkler heads and sprinkler water lines.
4. Plumbing waste lines, downspouts and vents
5. Refrigeration lines
6. Plumbing water lines
7. Electrical conduit.

3.6 EQUIPMENT PADS

- A. Provide four-inch minimum concrete housekeeping pads for all floor mounted equipment.

3.7 ARRANGEMENT AND ALIGNMENT

- A. All equipment, ductwork, piping, etc. shall be arranged and aligned in accordance with the Drawings. Elevations, where given, must be held. Floor elevations, where given, are to high points of floor. Dimensions must be held as closely as possible. All dimensions are to be field checked for accuracy before fabrication.
- B. Install all equipment, ductwork, piping, etc. straight and direct as possible, generally forming right angles with, or running parallel with, walls or adjacent ductwork, piping, etc. All ductwork, piping, etc. shall be neatly spaced with risers and drops running plumb and true.
- C. Run ductwork, piping, etc. in wall chases, shafts, hung ceilings, recesses, etc., where same are provided. Do not run-in floor slab fill unless specifically so noted on Drawings. Ductwork, piping, etc. shall not be covered or closed until testing is completed.
- D. Drawings, in general, are made to scale. All dimensions shall be checked in the field by the Contractor before final connections are fabricated.
- E. Drawings are, in general, diagrammatic and the exact locations shall be determined by the Contractor from field measurements. The actual arrangement, when erected, shall follow the general locations shown on the Drawings as far as practicable. The installation shall be neat in appearance and convenient to operate.
- F. Installations shall be coordinated with other Work to avoid blocking building

openings, light fixtures, etc. and shall not interfere with access to valves or equipment. Equipment, ductwork, piping, etc. shall be installed to provide working clearance for operation and maintenance.

3.8 ALIGNMENT OF ROTATING EQUIPMENT

- A. All pumps, fans, etc. or similar equipment directly connected to motors by means of flexible couplings must be perfectly aligned after installation using a dial indicator and the Work of alignment must be performed by a craftsman skilled in the Work.
- B. Belted equipment shall be aligned so that the grooves of the driver pulley are truly aligned with those of the driven sheave, and the belts must be in the proper tension, free from flutter. In multi-belt drives, all belts must be operated at the same plane. Flutter in anyone (1) belt will be cause to reject the entire set, as the original installation of belts must be in matched sets.
- C. All equipment provided with high-capacity belt drives must be conveniently tagged and so identified for future servicing and replacement of belts.
- D. Before any rotating equipment is put in operation for testing purposes, it shall be properly lubricated with lubricants recommended by the manufacturer, and they shall be further lubricated before the equipment is turned over to the Owner.

3.9 CLEARANCES

- A. Install ductwork, piping, etc. to provide minimum clearance of at least one (1) inch between extreme projections of piping, flanges, fittings, valves, allowing for insulation, expansion, etc.

3.10 EXPANSION

- A. Special attention shall be given to the installation of ductwork, piping, etc. which have an appreciable movement so that they will not hit other ducts, pipes, structural members, etc. under actual operating conditions.
- B. Provide flexible connections or expansion compensators where ducts, pipes, etc. cross building expansion joints.

3.12 DRAINAGE AND VENTING

- A. Where ducts, pipes, etc. are purposely pitched for drainage or venting, an accurate grade shall be maintained. Lines shall be supported in such a manner as to prevent deflection sufficient to pocket the lines.

3.13 PIPE SIZE DESIGNATIONS

- A. All pipe sizes referred to in these Sections should be interpreted as IPS (iron pipe size) unless specifically designated otherwise, such as "O.D." for tubing.

3.14 CUTTING AND PATCHING

- A. All cutting, repairing, fitting, and refinishing of in-place construction required for the installation of the Work of a Section, shall be included as part of the Work of that section except as specifically shown on Drawings or hereinafter specified.
- B. Work shall be performed by craftsmen skilled in their respective trades.
- C. Match existing conditions in color, materials, and texture.

3.15 DUCTWORK PIPE AND EQUIPMENT IDENTIFICATION

- A. Piping identification shall be as specified in related section. Equipment identification consistent with the markings on the equipment schedule shall be made following finished painting with paint or stencil letters or numerals as approved by the Architect/Engineer.

3.16 CLEANING - GENERAL AREA

- A. Contractor shall assist in maintaining the premises in an orderly fashion at all times, providing continuous clean-up during the construction period. Contractor shall remove all cartons, containers, and crates as soon as the contents have been removed and shall also remove all debris caused by Work as soon as possible. Deposit all discarded materials in a suitable refuse container and prevent these materials from being scattered by the elements. All cartons and debris shall be removed from the premises and site at the sole expense of Contractor.
- B. Contractor shall stack all construction materials associated with his/her Work in areas so as to avoid congestion and interference.
- C. At the completion of the work, the Contractor shall clean all of his/her work and

equipment free from dust and other foreign matter and shall leave the work in good housekeeping condition, in a manner acceptable to the Architect/Engineer.

3.17 WIRING DIAGRAMS

- A. Contractors shall provide each piece of electrically connected, controlled, or operated equipment with specific wiring diagrams and instructions. Diagrams and instructions shall not be of a general or typical nature but applicable only to the specific job. The diagrams and instructions used to install the equipment shall be identical to that included in the "Operations and Maintenance Manuals".

3.18 SYSTEM START UP

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify the Architect/Engineer and the Universities Director of Mechanical Services (7) seven working days prior to start-up of each item.
- C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions which may cause damage.
- D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer. Check ratings of overload relays for each starter.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable manufacturer's representative and Contractors' personnel in accordance with manufacturers' instructions.
- G. When called for in individual Specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.19 DEMONSTRATION AND INSTRUCTIONS

- A. Provide the services of a competent supervisor or technician to instruct the

Owner's personnel in the operation of each piece of equipment/systems installed as specified in the individual sections. Include not less than the time listed for each of the systems. Where required by the individual section of the specifications, provide the services of factory trained specialists to instruct the Owner's personnel in the operation of the equipment/system so specified.

- B. Demonstrate operation and maintenance of products to Owner's personnel, two (2) weeks prior to date of substantial completion. Provide an over/outline of the purpose and operation of all equipment installed under this contract.
- C. Demonstrate Project equipment and instruct in a classroom environment for up to 10 people, located at the project site and instructed by a qualified manufacturer's representative who is knowledgeable about the Project. Provide documents for all attendees.
- D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six (6) months.
- E. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual in detail with the Owner's personnel in detail to explain all aspects of operation and maintenance. Training shall include review of temperature control drawings and schematics.
- F. Demonstrate start-up, operation, control, adjustment, normal & unoccupied operations, system trouble-shooting, step by step procedure for determining the source of problems on the system level, component trouble-shooting description of diagnostic procedures for determining the source of the problems on the component level, servicing & maintenance instructions of required procedures for weekly, monthly, and annual preventive checks and timely repairs, sources of spare parts and special tools, and shut-down of each item of equipment at agreed time at designated location.
- G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- H. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.
- I. Training shall include a question-and-answer period.
- J. Training shall include special requirements of tenants for equipment's function.

- K. Training shall include any special issues to maintain warranties.
- L. Training shall include relevant health and safety issues and concerns, and special safety features.
- M. Training shall include Integral Controls Programming, trouble shooting, alarms, manual operation, and interface with Integral Controls.
- N. Training shall include Building Automation Controls Programming, trouble shooting, alarms, manual operation, and interface with Integral Controls.
- O. Training shall include interaction with other systems, and operation during power outage and fire.
- P. Training shall include common trouble shooting issues and methods, control system warnings and error messages including using the control system for diagnosis.
- Q. Digitally record all instructional sessions and demonstrations. Provide two DVD's/CD-Rom, labeled with all pertinent information to identify specific equipment or systems and include in the O & M's.

3.20 LUBRICATION

- A. During the commissioning process and prior to testing, all equipment shall be properly lubricated in accordance with the manufacturer's instructions. One (1) set of tools necessary for lubrication shall be provided by this Contractor.
- B. Except for small electrical motors which, under NEMA Standards, are equipped with lifetime lubrication, all bearings on large motors and mechanical equipment shall be equipped with lubrication fittings at all service points, accessibly located. Oil fill and drain line extensions shall be provided where necessary for convenient servicing of equipment.

3.21 TESTING

- A. Testing all equipment/ systems installed shall be the responsibility of the trade installing the Work under the supervision of an Engineer employed by the Contractor except as specified. The owner shall employ services of an independent firm to perform testing, adjusting and balancing:

1. The independent firm will perform services specified in related section.
 2. Reports will be submitted by the independent firm to the Engineer indicating observations and results of tests and indicating compliance or non-compliance with the requirements of the Contract Documents.
- B. Furnish all gages, instruments, test equipment and personnel required for the tests. Adjust all equipment to perform with the least possible noise and vibration consistent with its duty. Quietness of operation of all equipment is a requirement. Any equipment producing noise that is abnormal, in the opinion of the Architect/Engineer, shall be repaired or removed and replaced with satisfactory equipment at no additional expense.
- C. Operate the system and make all adjustments in control and equipment and complete necessary balancing to deliver not less than the air or fluid quantities shown on the Drawings for each equipment item.

3.22 TOOLS

- A. On completion of the Work, the Contractor shall furnish and deliver to the Owner any special tools and instrumentation that may be required for the proper servicing or routine testing of any equipment furnished under this Contract.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing, Adjusting, and Balancing of Air Systems:
 - a. Dual-duct systems.
 - 2. Testing, adjusting, and balancing of existing HVAC systems and equipment.
 - 3. Duct leakage tests verification.

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- F. TDH: Total dynamic head.
- G. UFAD: Underfloor air distribution.

1.3 PREINSTALLATION MEETINGS

- A. TAB Conference: Conduct a TAB conference at the project site. After approval of the TAB strategies and procedures plan, to develop a mutual understanding of the details. Provide a minimum of 14 days' advance notice of scheduled meeting time and location.
 - 1. Minimum Agenda Items:
 - a. The Contract Documents examination report.
 - b. The TAB plan.
 - c. Needs for coordination and cooperation of trades and subcontractors.
 - d. Proposed procedures for documentation and communication flow.

1.4 ACTION SUBMITTALS

- A. Sustainable Design Submittals:
 - 1. Air-Balance Report: Documentation indicating that Work complies with ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
 - 2. TAB Report: Documentation indicating that Work complies with ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB specialist and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Examination Report: Submit a summary report of the examination review required in "Examination" Article.
- C. Certified TAB reports.

1.6 QUALITY ASSURANCE

- A. TAB Specialists Qualifications, Certified by AABC:
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
 - 2. TAB Technician: Employee of the TAB specialist and certified by AABC.
- B. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
 - 1. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 7.2.2 - "Air Balancing."
- C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."
- D. Code and AHJ Compliance: TAB is required to comply with governing codes and requirements of authorities having jurisdiction.

1.7 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.
- B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for HVAC to verify that they are properly separated from adjacent areas and sealed.
- F. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- G. Examine test reports specified in individual system and equipment Sections.
- H. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- I. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

- A. Prepare a TAB plan that includes the following:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
 - b. Duct systems are complete with terminals installed.

- c. Volume, smoke, and fire dampers are open and functional.
- d. Clean filters are installed.
- e. Fans are operating, free of vibration, and rotating in correct direction.
- f. Variable-frequency controllers' startup is complete and safeties are verified.
- g. Automatic temperature-control systems are operational.
- h. Ceilings are installed.
- i. Windows and doors are installed.
- j. Suitable access to balancing devices and equipment is provided.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system in accordance with the procedures contained in AABC's "National Standards for Total System Balance" and in this Section.
- B. Cut insulation, ducts, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.
 - 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 - 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 233300 "Air Duct Accessories."
 - 3. Where holes for probes are required in piping or hydronic equipment, install pressure and temperature test plugs to seal systems.
 - 4. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish.
- C. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 DUCT LEAKAGE TESTS

- A. Witness the duct leakage testing performed by Installer.
- B. Verify that proper test methods are used and that leakage rates are within specified limits.
- C. Report deficiencies observed.

3.5 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan and equipment with fan(s).
 2. Measure and record flows, temperatures, and pressures of each piece of equipment in each hydronic system. Compare the values to design or nameplate information, where information is available.
 3. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 4. Check the refrigerant charge.
 5. Check the condition of filters.
 6. Check the condition of coils.
 7. Check the operation of the drain pan and condensate-drain trap.
 8. Check bearings and other lubricated parts for proper lubrication.
 9. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
- B. TAB After Construction: Before performing testing and balancing of renovated existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished in accordance with renovation scope indicated by Contract Documents. Verify the following:
1. New filters are installed.
 2. Coils are clean and fins combed.
 3. Drain pans are clean.
 4. Fans are clean.
 5. Bearings and other parts are properly lubricated.
 6. Deficiencies noted in the preconstruction report are corrected.
- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
 2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.

4. Balance each air outlet.

3.6 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 1. Air Outlets and Inlets: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.7 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 2. Include a list of instruments used for procedures, along with proof of calibration.
 3. Certify validity and accuracy of field data.
- B. General Report Data: In addition to form titles and entries, include the following data:
 1. Title page.
 2. Name and address of the TAB specialist.
 3. Project name.
 4. Project location.
 5. Architect/Engineer's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents, including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.

- c. Description of system operation sequence if it varies from the Contract Documents.
- 12. Nomenclature sheets for each item of equipment.
- 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
- 14. Notes to explain why certain final data in the body of reports vary from indicated values.
- 15. Test conditions for fans performance forms, including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Heating coil, dry-bulb conditions.
 - e. Face and bypass damper settings at coils.
 - f. Other system operating conditions that affect performance.

END OF SECTION

SECTION 26 05 00

COMMON WORK FOR ELECTRICAL

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes, but not limited to:
1. Raceways.
 2. Building wire and connectors.
 3. Switches.
 4. Grounding.
 5. Supporting devices for electrical components.
 6. Electrical identification.
 7. Concrete equipment bases.
 8. Cutting and patching for electrical construction.
 9. Field testing.
 10. Touchup painting.

1.2 DEFINITIONS

- A. Finished Areas: In general, areas with carpet or tile floors, lay in or fixed ceiling tile, special architectural ceiling treatment, or tiled, plastered, or paneled walls shall be considered finished areas.
- B. Interior: For the purposes of this specification, interior is any area within the boundaries of the foundation of any building within the superstructure or other structures not classified as a building.
- C. Concealed: Embedded in or installed behind walls, within partitions, above suspended ceilings, below grade, in trenches, in tunnels and in crawl spaces.
- D. Exposed: Not installed underground or "concealed" as defined above
- E. Provide: To furnish and install (complete, tested, and ready for operation).
- F. Furnish: To purchase and deliver products to the project site and make ready for installation.
- G. Install: To take furnished products, assemble, erect, secure, connect, and place into operation.
- H. Products: Includes materials, systems and equipment.
- I. Work: The providing of products for entire contract.

- J. EMT: Electrical metallic tubing.
- K. FMC: Flexible metal conduit.
- L. IMC: Intermediate metal conduit.
- M. LFMC: Liquidtight flexible metal conduit.
- N. RNC: Rigid nonmetallic conduit.

1.3 SUBMITTALS

- A. Action Submittal
 - 1. Product Data: For all products specified.
 - 2. Shop Drawings: Dimensioned plans and sections or elevation layouts of all electrical equipment specified.
 - 3. Field Test Reports: Indicate and interpret test results for compliance with performance requirements.
- B. Informational Submittal
 - 1. None Required.

1.4 QUALITY ASSURANCE

- A. Codes and Standards: Perform all work in compliance with applicable requirements of governing agencies having jurisdiction and in accordance with these plans and as specified herein.
 - 1. All work shall be installed in full accordance with the latest edition of the National Electrical Code (NEC) as prepared and published by the National Fire Protection Association (NFPA) and any applicable local or state codes. All electrical equipment shall be listed and labeled by Underwriters' Laboratories, Inc. (UL) or any approved independent nationally recognized electrical testing laboratory where such standards exist. Optionally, in lieu of such listing and labeling, equipment preapproved by the Electrical Inspector may be supplied. Wherever UL compliance is mentioned in the specifications, the above alternatives shall be understood to apply to all listing and labeling requirements. This does not preempt or replace the specifications or replace the approval process. All service switches/circuit breakers shall be listed and labeled as outlined above for service entrance duty.
 - 2. Comply with the requirements of the California Building Code (CBC).
 - 3. Comply with the requirements of NFPA Code 241 "Building Construction and Demolition Operations," the American National Standards Institute (ANSI) A10 Series standards for "Safety Requirements for Construction and Demolition," and the National Electrical Contractors Association (NECA) National Joint Guideline NJG 6 "Temporary Job Utilities and Services."

4. In addition to the requirements outlined under other sections of the Contract Documents, all Work, material, and equipment shall comply with all requirements of the latest editions and interim amendments of the National Electrical Safety Code, National Fire Protection Association, OSHA, the building Owner's insurance company, and all applicable federal, state, and local laws and ordinances. All materials shall be listed and labeled by UL and installed as required by the listing.
5. Should any changes in the Drawings or the Project Manual be required to conform to the above regulations, the Contractor shall notify the A/E at the time of submitting his bid. After entering into the Owner Contractor Agreement, the Contractor shall be held to complete all Work necessary to meet these requirements without additional expense to the Owner.

B. Permits and Regulations

1. The Contractor shall obtain all permits required by laws, ordinances, rules, regulations, and public authority having jurisdiction. The Contractor shall obtain certificates of inspections as required by the permit documents and shall submit same to the A/E and shall pay all fees, charges, and expenses in connection therewith. The Contractor shall furnish to the Owner a certificate of final inspection from the proper authority prior to final payment. Obtain and pay for easements required to bring temporary utilities to the site, where the Owner's easement cannot be utilized for that purpose.
2. The Contractor shall not allow or cause any of the Work to be covered up or enclosed until the A/E or Owner has been notified and given reasonable opportunity (3 working days) to review the Work. When required by law or regulations, the governmental agency having jurisdiction for inspections shall be given reasonable notice and opportunity to inspect the Work. Any Work that is enclosed or covered up before such inspection and test shall be uncovered at the Contractor's expense; after it has been inspected, the Contractor shall restore the Work to its original condition at his own expense.

C. Interpretation of Drawings and Project Manual

1. Any discrepancies between Drawings, Project Manual, Drawings and Project Manual, or within Drawings and Project Manual shall be promptly brought to the attention of the A/E for clarification during the bidding period. No allowance shall subsequently be made to the Contractor by reason of his failure to have brought said discrepancies to the attention of the A/E during the bidding period or of any error on the Contractor's part.
2. The locations of switch, receptacle, light, motor, outlets, etc. shown on Drawings are approximate. The Contractor shall use good judgment in placing the preceding to eliminate all interference with ducts, piping, etc. Where any doubt exists, the exact location shall be determined by the A/E.

3. Check all door swings so that light switches are not located behind doors. Relocate switches as required, with A/E's review.
4. All general trades and mechanical Drawings shall be checked by the Contractor before installing any outlets, power wiring, etc.
5. Equipment sizes and locations shown on the Drawings are estimated. Before installing any wire or conduit, the Contractor shall obtain the exact equipment requirements, including wire and conduit entrance locations, and install wire, conduit, disconnect switches, motor starters, overload heaters, circuit breakers, or other items of the correct size and locations for the equipment actually installed. However, wire and conduit sizes shown on the Drawings shall be taken as a minimum and shall not be reduced without written approval from the A/E.
6. The Contractor shall provide all wiring, including disconnect switches and starters for all electrically operated equipment shown on Drawings, specified or required, except that starters and/or disconnect switches need not be furnished where it is specifically noted that they are furnished with the equipment.
7. The Drawings show the general arrangement required for installation of equipment and materials. The Contractor shall follow these Drawings as closely as possible. Should conditions necessitate other arrangements, the Contractor shall prepare and submit drawings showing the changes to the A/E for review before proceeding with the Work.
8. The A/E reserves the right to make minor changes in the location of the installation of equipment and materials up to the time of roughing in at no extra cost to the Owner.
9. The Drawings, do not show all offsets and do not detail every point at which unusual conditions of construction may require special attention. All additional fittings, conduits or specialties and other appurtenances necessary due to field conditions shall be provided by the Contractor.
10. In all cases where a device or part of the equipment is herein referred to in the singular number, it is intended that such reference shall apply to as many such devices as are required to complete the installations.

1.5 COORDINATION

- A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installations that follow.
 1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
- B. Sequence, coordinate, and integrate installing electrical materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

- C. Coordinate electrical service connections to components furnished by utility companies.
 - 1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components.
 - 2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.
- D. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces. Access doors and panels are specified in Division 8 Section "Access Doors."
- E. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.
- F. Where electrical identification markings and devices will be concealed by acoustical ceilings and similar finishes, coordinate installation of these items before ceiling installation.

1.6 DESCRIPTIONS

- A. The Contractor shall provide the labor, tools, equipment, and materials necessary to complete and leave ready for operation all electrical systems as called for in these specifications or shown on the drawings and all details essential to complete the work. Items omitted from either the specifications or the drawings, but shown or described in the other trades, and all items necessary to make the electrical system complete and workable shall form a part of the work. No "extras" will be allowed.
- B. By submitting a bid, the Contractor certifies that:
 - 1. He has visited the site and is satisfied that he understands all site conditions that may have an effect on his bid price.
 - 2. He fully understands the make-up, construction, and operation of all systems and equipment he is bidding on, and he has included in his price all materials, supplies, accessories, and services necessary to make these systems complete and operational.
- C. Abbreviations used in these specifications:
 - 1. ADA - Americans with Disabilities Act
 - 2. ANSI - American National Standards Institute
 - 3. CBM - Certified Ballast Manufacturers
 - 4. EIA - Electronic Industries Association
 - 5. ETL - Electrical Testing Laboratories

6. FCC - Federal Communications Commission
 7. ICEA - Insulated Cable Engineers Association
 8. IEC - International Electro Technical Commission
 9. IES - Illuminating Engineering Society
 10. IEEE - Institute of Electrical and Electronics Engineers
 11. ITL - Independent Testing Laboratories
 12. NEC - National Electrical Code
 13. NECA - National Electrical Contractors Association
 14. NEMA - National Electrical Manufacturer's Association
 15. NESC - National Electrical Safety Code
 16. UL - Underwriters Laboratories
 17. A/E - Architect of Record or Engineer of Record
- D. The Contractor shall turn over all certificates of approval for inspections of electrical work to the Owner promptly when received. These certificates must be received before payment will be made for the Work involved. The Contractor shall secure and pay for all permits and inspections required for the Work.
- E. The Contractor shall not allow or cause any of the Work to be covered up or enclosed until it has been inspected. Any Work that is enclosed or covered up before such inspection and test shall be uncovered at the Contractor's expense; after it has been inspected, the Contractor shall restore the Work to its original condition at his own expense.
- F. The Contractor shall keep an up-to-date record of all deviations from the Contract Documents. At completion of this Project, the Contractor shall deliver a set of As-Built Drawings and Specifications showing these deviations to the Owner.
- G. Certain areas require the Contractor to remove, add to, or relocate portions of existing Work. It shall be the Contractor's responsibility to remove ceiling, portions of walls, etc. in a manner so that he may install new Work. The Contractor shall then patch, repair and/or replace ceilings, walls, etc. to match existing conditions. The above applies to all areas not specifically indicated on Architectural Drawings as work to be performed by General Trades Contractor(s).
- H. If the Contractor fails to do any required patching or repair any damage resulting from the installation of the electrical Work, such patching or repairing shall be done by the Owner and the cost shall be paid by the Contractor.
- I. The Contractor shall conduct such tests and adjustments of equipment as required to verify equipment performance. Such tests shall be conducted in the presence of the Owner or his representative.

- J. The Contractor shall remove all debris resulting from the Work, as well as all tools, equipment, etc. from the site upon completion of this contract. All equipment including lighting fixtures and lenses shall be clean and free from dirt, grease, finger marks, etc., before final acceptance.
- K. All equipment furnished and work performed under the Contract Documents shall be guaranteed against defects in materials or workmanship for a period of one (1) year from the date of final acceptance. Any failure of equipment or work due to defects in materials or workmanship shall be corrected by the Contractor at no cost to the Owner.
- L. During the construction operation the Contractor shall at all times maintain electrical utilities of the building without interruption. Should it be necessary to interrupt any electrical service or utility, the Contractor shall secure permission in writing from the Owner for such interruption at least 72 hours in advance. Any interruption shall be made with minimum amount of inconvenience to the Owner and any shut-down time shall have to be on an overtime basis and such time will be included in electrical bid.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Rigid Steel Conduit (RSC): UL 6 and galvanized by the hot-dip process. Fittings for rigid steel conduit shall be threaded.
- B. Electrical Metallic Tubing (EMT): ANSI C80.3, zinc-coated steel, with set-screw or compression fittings.
- C. Flexible Metallic Conduit (FMC): Zinc-coated steel.
- D. Intermediate Metal Conduit (IMC): ANSI C80.6, zinc-coated steel, with threaded fittings.
- E. Liquidtight Flexible Metal Conduit (LFMC): Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket.
- F. Rigid Nonmetallic Conduit (RNC): NEMA TC 2, Schedule 40 PVC, with NEMA TC3 fittings.
- G. Raceway Fittings: Specifically designed for the raceway type with which used.
- H. Wireways and Auxiliary Gutters: a minimum 4- by 4 inch trade size.
- I. Surface Raceways and Assemblies: shall conform to NFPA 70. Receptacles shall conform to NEMA WD 1, Type 5-15R or 5-20R.
- J. Cable Trays: ladder type cable trays conforming to NEMA VE 1.
- K. All conduits shall be 3/4" minimum except where otherwise noted. All conduits in finished spaces shall be concealed.

2.2 CONDUCTORS

- A. Conductors, No. 10 AWG and Smaller: Solid or stranded copper.
- B. Conductors, Larger than No. 10 AWG: Stranded copper.
- C. Insulation: See one-line and drawings.
- D. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.3 SPLICES AND CONNECTORS

- A. Make all splices in AWG No. 8 and smaller with approved insulated electrical type connector.
- B. Make all splices in AWG No. 6 and larger with indenter crimp-type connectors and compression tools. Joints shall be wrapped with an insulating tape that has an insulation and temperature rating equivalent to that of the conductor.

2.4 PULL BOXES

- A. Pull boxes for use with conduit systems shall be in accordance with NEMA FB 1 and NEMA OS 1 and be not less than 4 inches deep. Furnish all pull and junction boxes with screw-fastened covers.

2.5 SAFETY SWITCHES

- A. Safety Switches:
 - 1. Safety switches shall comply with NEMA KS 1, and be the heavy-duty type with enclosure, voltage, current rating, number of poles, and fusing as indicated. Switch construction shall be such that, when the switch handle in the "ON" position, the cover or door cannot be opened. Cover release device shall be coinproof and be so constructed that an external tool shall be used to open the cover. Make provisions to lock the handle in the "OFF" position, but the switch shall not be capable of being locked in the "ON" position.
 - 2. Provide switches of the quick-make, quick-break type. Approve terminal lugs for use with copper conductors.
 - 3. Safety color coding for identification of safety switches shall conform to NEMA Z535.1

2.6 GROUNDING

- A. Ground all circuits, luminaires, receptacles, motors, panels and other exposed noncurrent carrying metal parts of electrical equipment in accordance with the NEC.
- B. Provide all materials and labor to install a grounding system and bonded to approved, adequate grounding electrode(s).
- C. Provided an equipment grounding conductors in all electrical circuits.

- D. Where grounding conductors are susceptible to mechanical damage, they shall be installed in a rigid non-ferrous raceway.
- E. Conductors for grounding system shall be soft or medium hard drawn, stranded, insulated copper, except where otherwise notes. All conductors #8AWG and smaller shall be insulated, green in color. Ground conductors below grade or in slab shall be bare.
- F. All conductors to bus bars, structural members, pipes, and splices of ground conductors shall be made by exothermic welds, except where otherwise noted. All connections to bar lugs shall be exothermic weld or compression type. Bolted type connection of ground conductors may only be made where terminal lugs or blocks have been furnished and installed in equipment by manufacturer. Exothermic welds shall be: Cadweld or Therm-O-Weld.

2.7 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch- diameter slotted holes at a maximum of 2 inches o.c., in webs.
- C. Slotted-Steel Channel Supports: Comply with Division 5 Section "Metal Fabrications" for slotted channel framing.
 - 1. Channel Thickness: Selected to suit structural loading.
 - 2. Fittings and Accessories: Products of the same manufacturer as channel supports.
- D. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch- diameter holes at a maximum of 8 inches o.c., in at least one surface.
 - 1. Fittings and Accessories: Products of the same manufacturer as channels and angles.
 - 2. Fittings and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
- E. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- F. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.
- G. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.

- H. Expansion Anchors: Carbon-steel wedge or sleeve type.
- I. Toggle Bolts: All-steel springhead type.
- J. Powder-Driven Threaded Studs: Heat-treated steel.

2.8 ELECTRICAL IDENTIFICATION

- A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
- B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
 - 1. Type: Pretensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
 - 2. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
 - 3. Color: Black letters on orange background.
 - 4. Legend: Indicates voltage.
- C. Junction Box Labels:
 - 1. Type: Preprinted, flexible, self-adhesive, vinyl. Legend is overlaminated with a clear, weather- and chemical-resistant coating.
 - 2. Color: Black letters on white background.
 - 3. Legend: Indicates type of service (Power, Telecom, or Fire Alarm).
- D. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide by 3 mils thick.
- E. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
 - 1. Not less than 6 inches wide by 4 mils thick.
 - 2. Compounded for permanent direct-burial service.
 - 3. Embedded continuous metallic strip or core.
 - 4. Printed legend that indicates type of underground line.
- F. Tape Markers for Wire: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.
- G. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

- H. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch minimum thickness for larger sizes. Engraved legend in black letters on white background.
- I. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.
- J. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch, galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch grommets in corners for mounting.
- K. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.9 TOUCHUP PAINT

- A. For Equipment: Equipment manufacturer's paint selected to match installed equipment finish.
- B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 RACEWAY APPLICATION

- A. Use the following raceways for outdoor installations:
 - 1. Exposed: RSC.
 - 2. Concealed: RSC.
 - 3. Underground: RNC.
 - 4. Connection to Vibrating Equipment: LFMC.
 - 5. Boxes and Enclosures: NEMA 250, Type 3R or Type 4X.

- B. Use the following raceways for indoor installations:
 - 1. Exposed greater than 8' AFF: RSC or EMT.
 - 2. Exposed up to 8' AFF: RSC.
 - 3. Concealed in Ceilings, Walls, and Partitions: EMT.
 - 4. Concealed in Concrete, below Slab-on-Grade, and in Crawlspace: RSC or RNC.
 - 5. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC.
 - 6. Damp or Wet Locations: IMC or RSC.
 - 7. Boxes and Enclosures: NEMA 250, Type 1 (Dry locations), Type 3R or 4X (Damp or Wet locations).
- C. Raceway Fittings: Compatible with raceways and suitable for use and location.

3.3 CONDUCTORS APPLICATION

- A. Exposed Feeders: See one-line and drawings.
- B. Feeders Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN in raceway.
- C. Feeders Concealed in Concrete, below Slabs-on-Grade, and in Crawlspace: Type THWN in raceway.
- D. Exposed Branch Circuits, including in Crawlspace: Type THHN-THWN in raceway.
- E. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN in raceway or Metal-clad cable, Type MC.
- F. Branch Circuits Concealed in Concrete and below Slabs-on-Grade: Type THWN in raceway.
- G. Underground Feeders and Branch Circuits: Type XHHW in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord.
- I. Fire Alarm Circuits: Power-limited, fire-protective, signaling circuit cable.

3.4 RACEWAY AND CABLE INSTALLATION

- A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.
- B. Install raceways and cables at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

- C. Use temporary raceway caps to prevent foreign matter from entering.
- D. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.
- E. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.
- F. All conduits and fittings shall be run in straight lines parallel with or at right angles to building walls, partitions, floors and ceilings. When the location on the Plans interferes with other work in place or subsequently to be placed, the Contractor shall work out a satisfactory location, free from interferences. Individual conduits shall be rigidly supported and clamped with one-hole conduit clamps, conduit beam clamps, conduit hangers, or wall brackets, as required for the type of construction and/or as indicated on the Drawings. The use of perforated flat steel straps for supporting conduits will not be permitted. Conduits shall be secured so that they cannot be moved without the use of tools. Where a group of conduits run together, support the conduits on hangers fabricated from light steel framing unless otherwise shown on the Drawings.
- G. Conduit runs between outlet and outlet, between fitting and fitting, or between outlet and fitting shall not contain more than the equivalent of three 90-degree bends, including those bends located immediately at the outlet or fitting.
- H. Install raceways embedded in slabs in middle third of slab thickness where practical, and leave at least 1-inch concrete cover.
 - 1. Secure raceways to reinforcing rods to prevent sagging or shifting during concrete placement.
 - 2. Space raceways laterally to prevent voids in concrete.
 - 3. Install conduit larger than 1-inch trade size (DN27) parallel to or at right angles to main reinforcement. Where conduit is at right angles to reinforcement, place conduit close to slab support.
 - 4. Transition from nonmetallic tubing to Schedule 40 or 80 nonmetallic conduit, rigid steel conduit, or IMC before rising above floor.
 - 5. Make bends in exposed parallel or banked runs from same centerline to make bends parallel. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for exposed parallel raceways.
- I. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches of slack at each end of the pull wire.
- J. Install telephone and signal system raceways, 2-inch trade size (DN53) and smaller, in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements, in addition to requirements above.

- K. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.
- L. Set floor boxes level and trim after installation to fit flush to finished floor surface.

3.5 WIRING INSTALLATION

- A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- B. Install wiring at outlets with at least 12 inches of slack conductor at each outlet.
- C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6 SAFETY SWITCHES

- A. Securely fasten switches to the supporting structure or wall, utilizing a minimum of four 1/4 inch bolts. Do not use sheet metal screws and small machine screws for mounting. Do not mount switches in an inaccessible location or where the passageway to the switch may become obstructed. Mounting height shall be 5 feet above floor level, when possible.

3.7 BOXES AND FITTINGS

- A. Furnish and install pullboxes where necessary in the conduit system to facilitate conductor installation. Conduit runs longer than 100 feet or with more than three right-angle bends shall have a pullbox installed at a convenient intermediate location.
- B. Securely mount boxes and enclosures to the building structure with supporting facilities independent of the conduit entering or leaving the boxes.

3.8 IDENTIFICATION PLATES AND WARNINGS

- A. Furnish and install identification plates for lighting and power panelboards, motor control centers, all line voltage heating and ventilating control panels, fire detector and sprinkler alarms, door bells, pilot lights, disconnect switches, manual starting switches, and magnetic starters. Process control devices and pilot lights shall have identification plates.
- B. Furnish identification plates for all line voltage enclosed circuit breakers, identifying the equipment served, voltage, phase(s) and power source. Circuits 480 volts and above shall have conspicuously located warning signs in accordance with OSHA requirements.
- C. Furnish identification labels for all junction boxes. Label shall indicate the type of service (Power (with circuit numbers), Telecom., or Fire Alarm). Concealed boxes may have permanent, handwritten labels. Exposed boxes shall have a permanent, type written label.

- D. Furnish identification plates for new telecommunication racks.

3.9 ELECTRICAL SUPPORTING DEVICE APPLICATION

- A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.
- B. Dry Locations: Steel materials.
- C. Support Clamps for PVC Raceways: Click-type clamp system.
- D. Selection of Supports: Comply with manufacturer's written instructions.
- E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb (90-kg) design load.

3.10 SUPPORT INSTALLATION

- A. Install support devices to securely and permanently fasten and support electrical components.
- B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.
- C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.
- D. Size supports for multiple raceway installations so capacity can be increased by a 25 percent minimum in the future.
- E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps.
- F. Support cable trays from ceiling hangers, equipment bays, or floor or wall supports. Cable trays may be mounted on equipment racks. Provide support when the free end extends beyond 3 feet. Maximum support spacing shall be 6 feet. Trays 10-inches wide or less shall be supported by one hanger. Trays greater than 10-inches wide shall be supported by two hangers. Bond cable trays at splices.
- G. Install 1/4-inch- diameter or larger threaded steel hanger rods, unless otherwise indicated.
- H. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.
- I. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.
- J. Simultaneously install vertical conductor supports with conductors.

- K. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet-metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches from the box.
- L. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
- M. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.
- N. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
 - 1. Wood: Fasten with wood screws or screw-type nails.
 - 2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
 - 3. New Concrete: Concrete inserts with machine screws and bolts.
 - 4. Existing Concrete: Expansion bolts.
 - 5. Instead of expansion bolts, threaded studs driven by a powder charge and provided with lock washers may be used in existing concrete.
 - 6. Light Steel: Sheet-metal screws.
 - 7. Fasteners: Select so the load applied to each fastener does not exceed 25 percent of its proof-test load.

3.11 IDENTIFICATION MATERIALS AND DEVICES

- A. Install at locations for most convenient viewing without interference with operation and maintenance of equipment.
- B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Use consistent designations throughout Project.
- C. Self-Adhesive Identification Products: Clean surfaces before applying.
- D. Identify raceways and cables with color banding as follows:
 - 1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches wide, completely

- encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (8-m) maximum intervals in congested areas.
 3. Colors: As follows:
 - a. Fire Alarm System: Red.
 - b. Security System: Blue and yellow.
 - c. Telecommunication System: Green and yellow.
- E. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.
- F. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches, overall, use a single line marker.
- G. Color-code 208/120-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 1. Phase A: Black.
 2. Phase B: Red.
 3. Phase C: Blue.
- H. Color-code 480/277-V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
 1. Phase A: Yellow.
 2. Phase B: Brown.
 3. Phase C: Orange.
- I. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.
- J. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch- high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.12 FIRESTOPPING

- A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly. Firestopping materials and installation requirements are specified in Division 7 Section "Firestopping."

3.13 CUTTING AND PATCHING

- A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.
- B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.14 FIELD QUALITY CONTROL

- A. Inspect installed components for damage and faulty work, including the following:
 - 1. Raceways.
 - 2. Building wire and connectors.
 - 3. Supporting devices for electrical components.
 - 4. Electrical identification.
 - 5. Cutting and patching for electrical construction.
 - 6. Touchup painting.
- B. Test Owner's electricity-metering installation for proper operation, accuracy, and usability of output data.
 - 1. Connect a load of known kW rating, 1.5 kW minimum, to a circuit supplied by the metered feeder.
 - 2. Turn off circuits supplied by the metered feeder and secure them in the "off" condition.
 - 3. Run the test load continuously for eight hours, minimum, or longer to obtain a measurable meter indication. Use a test load placement and setting that ensure continuous, safe operation.
 - 4. Check and record meter reading at end of test period and compare with actual electricity used based on test load rating, duration of test, and sample measurements of supply voltage at the test load connection. Record test results.

5. Repair or replace malfunctioning metering equipment or correct test setup; then retest. Repeat for each meter in installation until proper operation of entire system is verified.

3.15 FIELD TESTING

- A. Submit Test Reports in accordance with referenced standards in this section.
- B. After completion of the installation and splicing, and prior to energizing the conductors, perform wire and cable continuity and insulation tests as herein specified before the conductors are energized.
- C. Conductors shall provide all necessary test equipment, labor, and personnel to perform the tests, as herein specified.
- D. Isolate completely all wire and cable from all extraneous electrical connections at cable terminations and joints. Substation and switchboard feeder breakers, disconnects in combination motor starters, circuit breakers in panel boards, and other disconnecting devices shall be used to isolate the circuit under test.
- E. Perform Insulation-Resistance Test on each field-installed conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Take readings after 1 minute and until the reading is constant for 15 seconds. Minimum insulation-resistance values shall not be less than 25 Megohms for 300 volt rated cable and 100 Megohms for 600 volt rated cable. For circuits with conductors sizes 8AWG and smaller insulation resistance testing is not required.
- F. Perform Continuity Test to insure correct cable connection (i.e. correct phase conductor, ground conductor, and grounding conductor wiring) end-to-end. Any damages to existing or new electrical equipment resulting from contractor mis-wiring will be repaired and re-verified at contractor's expense. All repairs shall be approved by the A/E prior to acceptance of the repair.
- G. Conduct Phase-Rotation Tests on all three-phase circuits using a phase-rotation indicating instrument. Perform phase rotation of electrical connections to connected equipment clockwise, facing the source.
- H. Final acceptance will depend upon the successful performance of wire and cable under test. Do not energize any conductor until the final test reports are reviewed and approved by the A/E.

3.16 REFINISHING AND TOUCHUP PAINTING

- A. Refinish and touch up paint. Paint materials and application requirements are specified in Division 9 Section "Painting."
 1. Delete subparagraphs below if Division 9 Section "Painting" specifies this work.
 2. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.

3. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
4. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
5. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.17 CLEANING AND PROTECTION

- A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.
- B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 26 05 49

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Single conductor building wire.
- B. Wiring connectors.
- C. Electrical tape.
- D. Heat shrink tubing.
- E. Wire pulling lubricant.
- F. Cable ties.

1.02 RELATED REQUIREMENTS

- A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

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. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2009.
- I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- M. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- N. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- O. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

1.04 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.

1.05 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. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

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. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.

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. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductor Material:
 - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
 - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 3. 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 (23 m): 10 AWG, for voltage drop.
 - 2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
 - 3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.
 2. Control Circuits: 14 AWG.
- J. 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. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. 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. Southwire Company: www.southwire.com/#sle.
 - d. Rome Wire and Cable.
 - e. Okonite Wire
 - f. Pirelli Wire and Cable
 - g. Carol Cable
- 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.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
 - a. Size 4 AWG and Larger: Type XHHW-2.
 - b. Installed Underground: Type XHHW-2.

2.04 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. Wiring Connectors for Splices and Taps:
 - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
 - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- C. 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. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
- D. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- E. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
- F. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
- G. Mechanical Connectors: Provide bolted type or set-screw type.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.05 WIRING ACCESSORIES

- A. Electrical Tape:
1. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
 3. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.

- 4. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
- 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- 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.
- C. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the 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.

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. Arrange circuiting to minimize splices.
 - 4. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.

5. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
6. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among 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. 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.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. 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.
 2. Installation in Vertical Raceways: Provide supports where vertical rise exceeds permissible limits.
- G. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- H. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
- I. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- J. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

- K. 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 contaminants. 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.
- L. 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.
 - 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.
- M. Insulate ends of spare conductors using vinyl insulating electrical tape.
- N. 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.
- O. Identify conductors and cables in accordance with Section 260553.
- P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section Firestopping.

- Q. 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. Inspect and test in accordance with NETA ATS, except Section 4.
- 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.
- C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 05 33.13

CONDUITS FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Galvanized steel rigid metal conduit (RMC).
- B. PVC-coated galvanized steel rigid metal conduit (RMC).
- C. Flexible metal conduit (FMC).
- D. Liquidtight flexible metal conduit (LFMC).
- E. Electrical metallic tubing (EMT).
- F. Rigid polyvinyl chloride (PVC) conduit.
- G. Conduit fittings.
- H. Accessories.

1.02 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2015.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2015.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.
- E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2003.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit 2018.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2013.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2016.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.

- L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- M. UL 360 - Liquid-Tight Flexible Steel Conduit Current Edition, Including All Revisions.
- N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
 - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
 - 5. Notify Architect of any 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 is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- B. Project Record Documents: Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

- B. 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 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use rigid PVC conduit.
 - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
 - 4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.
 - 5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
 - 6. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.
- D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

- I. 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 (2.4 m), except within electrical and communication rooms or closets.
- J. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.
- L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
 - 1. Maximum Length: 6 feet (1.8 m).
- M. Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
 - 4. Vibrating equipment includes, but is not limited to:
 - a. Transformers.
 - b. Motors.
- N. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Minimum Conduit Size, Unless Otherwise Indicated:
 - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
 - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
 - 3. Control Circuits: 1/2 inch (16 mm) trade size.
 - 4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.
 - 5. Underground, Exterior: 1 inch (27 mm) trade size.
- D. 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. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).
- C. PVC-Coated Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
 - 3. Material: Use steel or malleable iron.
 - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. 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 to be used.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression (gland) or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. 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.
- B. 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.

2.09 ACCESSORIES

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. 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 all conduits unless specifically indicated to be exposed.
 - 4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
 - 5. Arrange conduit to maintain adequate headroom, clearances, and access.
 - 6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
 - 7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
 - 8. Route conduits above water and drain piping where possible.
 - 9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
 - 10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
 - 11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
 - a. Heaters.
 - b. Hot water piping.
 - c. Flues.
 - 12. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
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 conduit strap to support single surface-mounted conduit.
 - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
6. Use conduit clamp to support single conduit from beam clamp or threaded rod.
7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).
9. Use of spring steel conduit clips for support of conduits is not permitted.
10. Use of wire for support of conduits is not permitted.

H. 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. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
 7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- I. 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. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
 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. Include proposed locations of penetrations and methods for sealing with submittals.
 8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- J. Underground Installation:
1. Minimum Cover, Unless Otherwise Indicated or Required:
 - a. Underground, Exterior: 24 inches (610 mm).
 - b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.
 2. Provide underground warning tape along entire conduit length.
- K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section Concrete with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated.
- L. 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.
- M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
 2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.
- O. Provide grounding and bonding in accordance with Section 260526.
- P. Identify conduits in accordance with Section 260553.

3.02 FIELD QUALITY CONTROL

- A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.
- C. Correct deficiencies and replace damaged or defective conduits.

3.03 CLEANING

- A. Clean interior of conduits to remove moisture and foreign matter.

3.04 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 05 33.16

BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.
- 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 - UL Standard for Safety Industrial Control Panels 2018.
- J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.03 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 placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted

boxes where indicated.
8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.

1.05 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.

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 (1,650 cu cm), Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or 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 (Other Than Communications Systems Outlets): 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.
 - c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
 13. Wall Plates: Comply with Section 262726.
- C. Floor Boxes:
1. Three device box
 - a. When installed in on-grade floor, provide Wiremold RFB4-CI-1 with FPCTC series flange, RFB6GFI decora-style plate for each electrical & communications outlet and RFB6B blank plate for each AV outlet or unused compartment. Factory standard

finish/color selected by architect shall be brushed aluminum or plated brass.

- b. When shown in concrete, tile or wood floors used in gymnasium, sport court, vehicle display/maintenance areas or other uses that require completely flush, drive-over rated floor box provide Wiremold 880 CS3-1 with 837 series flangeless insert and 828GFI or 828R covers. Provide 3 gang box with appropriate inserts and covers as necessary to support device configuration(s). Factory standard finish/color selected by architect brass insert and cover or brushed aluminum insert and cover.
- c. When shown in on-grade floor furniture feed provide Wiremold (3) 880-MP with 880 MPA adjustment ring(s), 837 series flange, and
- d. (1) 829CK Series cover with 1/2" or 3/4" threaded opening as required (pwr) and (2) 829CK-1 series cover with 2-5/8" / 2-1/4" threaded openings (data). Verify furniture whip size with furniture vendor prior to ordering material. (carpet and tile applications). Factory standard finish/color selected by architect shall be brass flange and cover or brushed aluminum flange and cover.
- e. When shown in above grade floor provide Wiremold 6ATCP series with (1) 6MAAP 1-gang device mounting plate/(1) 1125CHA 1-1/4"C adapter. Use surface cover selection in carpeted areas. Use flush cover selection in hardwood, concrete, tile and other hard surface floors. Factory standard finish/color selected by architect shall be brass flange & cover or bronze flange & cover.

2. Floor box installation notes:

- a. The Design-Build Entity shall be responsible for the furnishing of all material, labor, equipment, and services, in connection with the installation of a complete and fully functioning and code compliant installation.
- b.
- c. It is the intent of the contract documents, which are presented in a diagrammatic format, to provide Design-Build Entity information that supplements and enhances the generally accepted construction means, methods, techniques, sequences and procedures employed in connection with installation of this type of product / system.
- d. The Design-Build Entity shall also incorporate the requirements of the manufacturer's installation instructions / warranty requirements as part of the requirements of the construction documents. In the event of a conflict between the contract document requirements

and the manufacturers installation requirements, the more stringent requirements shall apply - unless the more stringent requirement voids applicable warranties or violates the requirements of the local authority having jurisdiction. Any such conflict shall immediately be brought to the attention of the engineer in writing through the formal RFI process.

- e. Refer to the associated schedules, schematics, drawings, and specifications for detailed information / requirements on this product / system.
- f. It is the responsibility of the Design-Build Entity to verify the use of PVC boxes on-grade is acceptable with the local authority-
- g. having- jurisdiction (AHJ) prior to bid. Should the AHJ require the use of cast boxes when on-grade, the Design-Build Entity shall provide cast walker boxes complete with device plates/adapters as required to meet the intent of the drawings. All costs for cast boxes shall be included in the base bid.
- h. All floor boxes shall be listed to meet UL 514a and 514c scrub water test.
- i. Design-Build Entity shall bid the most expensive standard trim finish/material as part of base bid. Should the architect select less expensive trim finishes/material for some or all floor boxes during the submittal process, Design-Build Entity shall provide a credit to the owner for the difference in cost the trim finishes/materials.
- j. Design-Build Entity shall coordinate with all other trades as required to ensure that floor box and poke-thru flanges/tops fit flush with final finished floor covering/surface. Gaps between flanges/tops and carpet, tile or other floor surfaces are unacceptable and shall be corrected at no additional cost. Refer to floor box schematic and specifications for more information.
- k. Design-Build Entity shall coordinate exact location of floor boxes with architect, owner, and furniture vendor prior to rough-in.
- l. Design-Build Entity shall provide any spare/additional adapters, bezels etc. To the owner or structured cabling Design-Build Entity.
- m. Floor boxes shall be capable of accepting AV, data and telephone communications jacks from a wide variety of communications device manufacturers. Floorboxes that accept only a single vendor's AV, data and communications jacks are unacceptable.
- n. When located in areas subject to vehicle traffic, provide traffic rated flange.
- o. Furniture system data-only poke-thru floor devices require use of 90 degree conduit fitting and conduit nipple as shown when located in fire-rated floor and shall be installed only after

coordination with the owner and the structured cabling Design-Build Entity. E.C. to comply with manufacturer's poke-thru installation instructions for this and other requirements necessary to maintain fire rating of pokethru.

- p. Design-Build Entity shall include all costs in base bid to accommodate relocating factory-furnished pokethru wiring junction boxes from any pokethru locations that occur 1) in a floor with a thickness that prevents access to the j-box(s) and/or 2) above an inaccessible ceiling to an area with no ceiling or an accessible ceiling. This effort shall include ordering custom extended length power wiring for prewired pokethrus and shall include coordinating with the modular systems furniture vendor, if any, to provide modular systems furniture power whips with extra conductor lengths as required to reach any relocated poke-thru junction boxes.
 - q. Where the specified poke-thru or floor box cannot be installed per manufacturer's recommendations and/or cannot be properly supported such as in shallow, non-rated floors, gypsum board rated floors or wood floors etc., Design-Build Entity shall include all costs in base bid to provide any necessary additional blocking/support structures required to ensure firm connection of the poke-thru or floor box to the building/facility structure.
 - r. Verify floor-box & poke-thru conduit requirements using both electrical, structural & architectural plans. If the plans conflict, the electrical Design-Build Entity shall include the most costly version of the plan in the base bid. At each on-grade floor box compartment used for other than power & where no conduit connection is shown on the plans, include all cost in the base bid to provide (1) 1-1/4"C.O. from compartment(s) to the nearest accessible ceiling. Issue a pre/post bid RFI to clarify the actual requirement prior to rough-in.
 - s. Provide shop drawing submittal per the general specification requirements for each type of floor box used.
- D. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
- 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:
 - 3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 - EXECUTION

3.01 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. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Box Locations:
 - 1. Locate boxes to be accessible. Provide access panels in accordance with Section Access Panels 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 262726.
 - 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 (150 mm) 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 (610 mm) 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 (610 mm) 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 (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) 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 260533.13.
- 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.
- H. Box Supports:
 - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 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.
- I. Install boxes plumb and level.
- J. 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 (6 mm) 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 (3 mm) at the edge of the box.
- K. Install boxes as required to preserve insulation integrity.
- L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

- M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- N. Close unused box openings.
- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 260526.

3.02 CLEANING

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.03 PROTECTION

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

1.02 RELATED REQUIREMENTS

- A. Section 260533.16 - Boxes for Electrical Systems.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2017h.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification) 2017g.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2015).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2016.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:
1. Do not install wiring devices until final surface finishes and painting are complete.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

1.06 QUALITY ASSURANCE

- A. Conform to requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Hubbell Incorporated: www.hubbell-wiring.com.
- B. Leviton Manufacturing Company, Inc: www.leviton.com.
- C. Lutron Electronics Company, Inc: www.lutron.com.
- D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

2.02 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.
- F. Provide GFCI protection for receptacles serving electric drinking fountains.
- G. Unless noted otherwise, do not use combination switch/receptacle devices.

2.03 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

2.04 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way or four way as indicated on the drawings.

2.05 RECEPTACLES

- A. Manufacturers:
 - 1. Hubbell Incorporated: www.hubbell-wiring.com.
 - 2. Leviton Manufacturing Company, Inc: www.leviton.com.
 - 3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.
 - 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.06 WALL PLATES

- A. Manufacturers:
1. Hubbell Incorporated: www.hubbell-wiring.com.
 2. Leviton Manufacturing Company, Inc: www.leviton.com.
 3. Lutron Electronics Company, Inc: www.lutron.com.
 4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us
- B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 2. Size: Standard.
 3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.
- D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches (1200 mm) above finished floor.
 - b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles, wall switches or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.

- 4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- 5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.
- L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- O. Identify wiring devices in accordance with Section 260553.

3.04 FIELD QUALITY CONTROL

- A. Inspect each wiring device for damage and defects.
- B. Operate each wall switch with circuit energized to verify proper operation.

- C. Test each receptacle to verify operation and proper polarity.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.06 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 – GENERAL

1.1. SECTION INCLUDES

- A. Interior luminaires.
- B. Exit signs.
- C. Drivers.
- D. Luminaire accessories.

1.2. RELATED REQUIREMENTS

- A. Section 26 05 33.16 - Boxes for Electrical Systems.
- B. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.

1.3. REFERENCE STANDARDS

- A. 47 CFR 15 - Radio Frequency Devices; current edition.
- B. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements; 2011.
- C. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code); 2013 (Corrigendum 2015).
- D. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).
- E. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- F. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- H. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.
- I. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.
- J. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility; 2012.
- K. CEC - California Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. NFPA 101 - Life Safety Code; 2017.

- M. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.
- N. UL 935 - Fluorescent-Lamp Ballasts; Current Edition, Including All Revisions.
- O. UL 1598 - Luminaires; Current Edition, Including All Revisions.
- P. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4. ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage, or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

1.5. QUALITY ASSURANCE

- A. Conform to requirements of CEC.

1.6. DELIVERY, STORAGE, AND PROTECTION

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.7. FIELD CONDITIONS

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.8. WARRANTY

- A. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 - PRODUCTS

2.1. MANUFACTURER: Refer to lighting fixture schedule on the plans for listed approved manufacturer or equal.

2.2. LUMINAIRE TYPES

- A. Furnish products as indicated in lighting fixture schedule included on the drawings.

2.3. LUMINAIRES

- A. Provide products that comply with requirements of CEC.
- B. Provide products that are listed and labelled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labelled as suitable for the purpose intended.
- D. 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.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
 - 1. Ceiling Compatibility: Comply with NEMA LE 4.
 - 2. Luminaires Recessed in Insulated Ceilings: Listed and labelled as IC-rated, suitable for direct contact with insulation and combustible materials.
- H. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- I. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
 - 1. LED Tape - General Requirements:
 - a. Listed.

- b. Designed for field cutting in accordance with listing.
 - c. Wet Location Applications: IEC 60529, IP 68 (waterproof) rated.
 - 2. White LED Tape:
 - a. Correlated Color Temperature (CCT): 4000 K unless otherwise indicated.
 - b. Color Rendering Index (CRI): Not less than 90.
- J. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.4. EXIT SIGNS

- A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes and listed and labelled as complying with UL 924.
 - 1. Number of Faces: Single or double as indicated or as required for the installed location.
 - 2. Directional Arrows: As indicated or as required for the installed location.

2.5. DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide drivers containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide drivers complying with all current applicable federal and state driver efficiency/efficacy standards.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.
 - a. Wall Dimmers: See Section 26 27 26.

2.6. ACCESSORIES

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, field-painted as directed.

PART 3 - EXECUTION

3.1. EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights
- C. and are properly sized to accommodate conductors in accordance with CEC.
- D. Verify that suitable support frames are installed where required.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- F. Verify that conditions are satisfactory for installation prior to starting work.

3.2. PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3. 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 securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Suspended Ceiling Mounted Luminaires:
 - 1. Do not use ceiling tiles to bear weight of luminaires.
 - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
 - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
 - 4. Secure pendant-mounted luminaires to building structure.
 - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
 - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.

7. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.
- G. Recessed Luminaires:
1. Install trims tight to mounting surface with no visible light leakage.
 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.

END OF SECTION

SECTION 27 05 28

PATHWAYS FOR COMMUNICATION SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Install empty raceway system, including under floor and overhead distribution system, fish wire, terminal cabinets, outlet boxes, floor boxes, pull boxes, cover plates, conduit, sleeves, caps, cable troughs, service poles, miscellaneous and positioning material to constitute complete system, as indicated for distribution of Telecommunications wiring which includes cables for Data, Voice, Video, Audio, Security and future signal requirements.
- B. The location at which all new telecommunications wiring will terminate is called a Telecom Outlet (TO). There are several styles of outlets:
 - 1. New construction
 - 2. Existing construction typical
 - 3. Existing construction variations
 - 4. Telephone (Voice) only
 - 5. Data only
- C. Furnish and install split channel raceway and outlet boxes as specified in the Drawings and as specified herein.
- D. Furnish and install conduit stubs in walls and floors for cable routes.

1.2 REFERENCES

- A. 250 – California Electric Code – Ground and Bonding ANSI/NFPA 70/318 – California Electric Code – Cable Trays
- B. 645 – California Electric Code – Information Technology Equipment ANSI/NFPA 70/770 – California Electric Code – Optical Fiber Cables and Raceways
- C. ASTM A 510 - Specifications for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
- D. ASTM B 633 - Specifications for Electrodepositing Coatings of Zinc on Iron and Steel, Sections SC2 and SC3
- E. ASTM A653 - Specifications for Steel Sheet, Zinc-Coated (Galvanized) by Hot Dip Process ASTM A123 - Specifications for Zinc (Hot Galvanized) Coatings on Iron and Steel ANSI/TIA - 568-C series Commercial Building Telecommunications Cabling Standard.

- F. ANSI/TIA - 569-C Commercial Building Standard for Telecommunications Pathways and Spaces ASTM – A276-06 Standard Specification for Stainless Steel Bars and Shapes
- G. ASTM A580/A580M-06 Standard Specification for Stainless Steel Wire NEMA VE 2-2006 Cable Tray Installation Guidelines
- H. NEMA VE-1/CSA C22.2 No 126 1-02 Metal Cable Tray Systems UL and cUL E209183
- I. ANSI C80.1 Rigid Steel Conduit - Zinc Coated ANSI C80.4 Fittings for Rigid Metal Conduit
- J. BICSI Electronic Safety and Security Reference Manual (ESSDRM), current edition
- K. BICSI Information Transport Systems Installation Methods Manual (ITSIM), current edition BICSI Network Design Reference Manual (NDRM), current edition
- L. BICSI Telecommunications Distribution Methods Manual (TDMM), current edition BICSI Wireless Design Reference Manual (WDRM), current edition

1.3 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
- B. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
- C. Assure that the "as installed" system is correctly and completely documented including engineering drawings, manuals, and operational procedures in such a manner as to support maintenance and future expansion of the system.
- D. Material and work specified herein shall comply with the applicable requirements of the current revision of the following:
 - 1. ANSI/TIA – 568 Commercial Building Telecommunications Cabling Standard
 - 2. TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

3. ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
4. CEC – California Electric Code
5. BICSI – Telecommunications Distribution Methods Manual

1.4 SUBMITTALS

- A. Product Data: For features, ratings, and performance of each component specified.
- B. Submit manufacturer's instructions for storage, handling, protection, examination, preparation, operation, and installation of products. Include application conditions or limitations of use stipulated by any product testing agency. Submit for the following:
 1. Wall Boxes
 2. Raceway
 3. Conduit
 4. Conduit Bushings
- C. Shop Drawings:
 1. Component List: List manufacturer, part number, and quantity of each component.
 2. Include dimensioned plan and elevation views of equipment rooms, labeling each individual component. Show raceway assemblies, method of field assembly, workspace requirements, and access for cable connections.

1.5 DELIVERY STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original un-opened containers and packaging, with labels clearly indication manufacturer and material.
- B. Storage: Store materials in a dry area indoors, protected from damage and in accordance with manufacturer's instructions.
- C. Handling: Protect materials and finishes during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 TELECOM OUTLETS (TO)

- A. New construction TO consists of one (1) 4-11/16" square by 2-1/8" deep flush mounted box. Each outlet box shall have a EMT conduit stubbed above the drop ceiling or extended into the hallway cable tray. Conduits size is as follows:

1. For Outlets with 3 or less cables, use a 1" EMT conduit
 2. For Outlets with 3-6 cables, use a 1.25" EMT conduit
 3. For all other sizes, calculate fill ratio at 40% for proper sized conduit
- B. Existing surface-mounted construction TO typically consists of surface-mounted raceway including base, cover, end fitting, entrance end fitting, and (2) 1" EMT conduits stubbed out top of entrance end fitting to above ceiling or out to nearest hallway distribution system. Size of the raceway is site dependent based on number of conductors to be installed.
- C. The intent of the installation of the TOs which consist of the raceway is as follows:
1. Where ceilings are accessible, the raceway and entrance end fitting shall extend above the ceiling and the conduits installed above the ceiling in the room to the nearest hallway distribution system.
 2. Where ceilings are partially accessible, or if the Drawings and/or Specifications indicate installation of access panels, the raceway shall extend above the ceiling and the conduits installed above the ceiling in the room to the nearest hallway distribution system.
 3. Where ceilings are inaccessible or no ceilings exist, the raceway shall extend up as close to the ceiling as practical to allow installation of conduits as high as possible to the nearest hallway distribution system.

2.2 HORIZONTAL DISTRIBUTION SYSTEMS

- A. Conduit System (Renovations only, where conduit exists)
1. Provide conduits secured to wall above corridor ceilings as shown on the Drawings or as specified herein for installation of telecommunications cables. Any exposed conduit
 2. Corridor conduits shall be 4" EMT, furnished in 10-foot lengths wherever possible, with no sharp edges, reamed as necessary, evenly supported at two locations per 10-foot section spacing. Conduits shall be sized and quantified to account for handling cables in all TO conduits at 40% fill back to the TR and/or ER rooms. Verify size prior to installation. Bushings and/or connectors on ends of EMT are required.
 3. All conduits shall be installed stacked and attached to walls unless conditions exist which prohibit this type of installation. When this condition exists, mount conduits side- by-side supported with 3/8" rod attached to building structure utilizing Unistrut channel to form a trapeze. Double nut the top and bottom at the Unistrut. Utilize conduit clamp to secure conduits to Unistrut.
 4. Provide measured pull line in each conduit rated at 1200 lbs. minimum. Increments must be in 12" steps.

5. Grounding of conduits is not required per CEC 250-33, Exception No. 2. shall be painted except conduit above suspended ceilings or in mechanical, electrical or telecommunication rooms. Color to match that of surface installed upon or as directed by Owner's Representative. Coordinate with other trades prior to painting.
6. Provide restorable fire stops inside and around conduits as recommended by UL1479 or ASTM E814 for all conduits penetrating fire-rated construction. Fire rated construction to be verified with AHJ.

2.3 STATION CONDUITS

Station conduit is defined as conduit that originates at the TO and rises within the walls or is exposed from a raceway and extends up into the drop ceiling or over to the hall-way distribution system.

- A. Provide station conduits from TOs to above the drop ceiling or extend over to the hallway distribution systems consisting of 1" EMT minimum or appropriate size as shown on the Drawings or as specified herein for installation of telecommunications cables.
- B. Provide an insulating press fit bushing on all telecommunications conduits including interconnecting nipples and stub to distribution system. To prevent conflicts with other cables or conduits to cable tray, the conduit shall be stubbed not less than 6" above or below conduit/cable tray center line. Where space permits, every effort shall be made to bend station conduits down such that the flow of installed cables promotes the minimum length back to the TR and the least amount of bends in the cables. Bushings must be rated to be used in an environmental air handling space (Plenum).
- C. Manufacturer of insulating bushing on all telecommunication conduits shall be Arlington or approved alternate equal.
- D. Provide measured pull line in 12" increments in each empty conduit to hallway distribution system.
- E. Indelibly mark station conduit at hallway distribution end with Room # that conduit serves.
- F. The use of 90 degree electrical pulling elbows is prohibited.
- G. Do not include more than two 90 degree sweeps between pulling points when installing station conduit runs. If the path of the station conduits requires more than 180 degrees of total bends, installation of an appropriate sized junction box is required.
- H. Place an appropriate sized junction box in each individual station conduit run that exceeds 100 feet in length.
- I. The use of a third bend in a conduit is only acceptable if:
 1. The total conduit run is reduced by 15%.
 2. The conduit size is increased to the next trade size.

3. One of the bends is located within 12" of the cable feed end.

2.4 JUNCTION BOX REQUIREMENTS FOR STATION CONDUITS

- A. If the station conduit route exceeds the 180 degree of total bends limitation, an appropriate sized junction box is required within a straight section of the conduit run.
- B. Each station conduit run requires a separate junction box. The sharing of a junction box by multiple conduits is prohibited.
- C. A junction box shall not be used in place of a bend. All junction boxes in station conduit paths shall be installed within a straight section of the conduit run.

2.5 NON-CONTINUOUS CABLE SUPPORT SYSTEMS

- A. Non-continuous cable supports
 1. Non-continuous cable supports shall provide a bearing surface of sufficient width to comply with required bend radii of high-performance cables; cULus Listed.
 2. Non-continuous cable supports shall have flared edges to prevent damage while installing cables.
 3. Non-continuous cable supports sized 1 5/16" and larger shall have a cable retainer strap to provide containment of cables within the hanger. The cable retainer strap shall be removable and reusable and be suitable for use in air handling spaces.
 4. Non-continuous cable supports shall have an electro-galvanized or G60 finish and shall be rated for indoor use in non-corrosive environments.
 5. Stainless Steel non-continuous cable supports are intended for indoor and outdoor use in non-corrosive environments or where only mildly corrosive conditions apply.
 6. Non-continuous cable supports shall be ERICO CableCat™ J-hook series CAT12, CAT21, CAT32, CAT64, CAT21SS, CAT32SS, CAT64SS; CAT-CMTM Double J-Hook CAT100CM; CAT-CMTM U-hook series CAT200CMLN, CAT300CMLN; and CAT-CMTM retainer CATRT200CM, CATRT300CM or approved equal.
- B. Adjustable non-continuous cable support sling
 1. Constructed from steel and woven laminate; sling length can be adjusted to hold up to 425 4-pair UTP; rated for indoor use in non-corrosive environments. Rated to support Category 5e and higher cable, or optical fiber cable; cULus Listed.
 2. Adjustable non-continuous cable support sling shall have a static load limit of 100 lbs.

3. Adjustable non-continuous cable support sling shall be suitable for use in air handling spaces.
 4. If required, assemble to manufacturer recommended specialty fasteners including beam clips, flange clips, C and Z purlin clips.
 5. Acceptable products: ERICO CADDY Cable CatTMCAT425; or approved equal.
- C. Multi-tiered non-continuous cable support assemblies
1. Multi-tiered non-continuous cable support assemblies shall be used where separate cabling compartments are required. Assemblies may be factory assembled or assembled from pre-packaged kits. Assemblies shall consist of a steel angled hanger bracket holding up to six non-continuous cable supports, rated for indoor use in non-corrosive environments; cULus Listed.
 2. If required, the multi-tier support bracket may be assembled to manufacturer recommended specialty fasteners including beam clamps, flange clips, C and Z purlin clips.
 3. The multi-tiered support bracket shall consist of ERICO CADDY CATHBA and CableCatTM J-Hooks with screws; or approved equal.
 4. Non-continuous cable support assemblies from tee bar
 5. Tee bar support bracket with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
 6. Acceptable products: ERICO CADDY CAT12TS, CAT21528, CAT32528; or approved equal.
- D. Non-continuous cable support assemblies from drop wire/ceiling
1. Fastener to wire/rod with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
 2. Acceptable products: ERICO CADDY CAT124Z34, CAT126Z34, CAT214Z34, CAT216Z34, CAT324Z34 or CAT326Z34; or approved equal.
- E. Non-continuous cable support assemblies from beam, flange
1. Fastener to beam or flange with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments; cULus Listed.
 2. Acceptable products: ERICO CableCatTM J-hook series CAT12, CAT21, CAT32, CAT64 with CADDY beam clamps and CADDY flange clips; or approved equal.

- F. Non-continuous cable support assemblies from wall, concrete, or joist
 - 1. Fastener to wall, concrete, or joist with one non-continuous cable support, factory or jobsite assembled; rated for indoor use in non-corrosive environments, cULus Listed.
 - 2. Acceptable products: ERICO CableCat™ J-hook series CAT12, CAT21, CAT32, CAT64, with CADDY angle bracket; or approved equal.
- G. Non-continuous cable support assemblies from threaded rod
 - 1. Fastener to threaded rod with one non-continuous cable support, factory or jobsite assembled, rated for indoor use in non-corrosive environments, cULus Listed.
 - 2. The multi-tiered support bracket shall have a static load limit of 300 lbs.
 - 3. U-hooks and Double J-hook shall attach directly to threaded rod using standard nuts.
 - 4. Acceptable products: ERICO CableCat™ J-hook, CAT12, CAT21, CAT32, CAT64 with CADDY CATHBA series; CAT-CMTM Double J-hook CAT100CM, CAT-CMTM Direct mount U-hook CAT200CMLN, CAT300CMLN; or AFAB series; or approved equal.
- H. Cantilever-Mounted cable supports
 - 1. U-hook shall be able to be assembled to a wide variety of wall mount brackets.
 - 2. Spacing of individual U-hooks as needed, max of 4' to 5' apart.
 - 3. U-hooks may have the optional attachment of a cable roller for ease in pulling cables.
 - 4. Acceptable products: ERICO CAT-CMTM U-hooks CAT200CMLN, CAT300CMLN; CAT-CM roller assemblies CATRL200CM, CATRL300CM; CATWMCM bracket; or approved equal.
- I. Installation accessories for non-continuous cable supports
 - 1. Cable Pulley
 - a. Non-continuous cable supports may be used as an installation tool when a removable pulley assembly is included. The pulley shall be made of plastic and be without sharp edges. The pin and bail assembly must be able to be secured to the J- Hook during cable installation. The pulley must remain secured while cables are being pulled.
 - b. The pin and roller assembly must be removed after cables are installed.

- c. Acceptable products: ERICO CADDY CAT32PLR, CAT64PLR, or approved equal.
- 2. Cable Protector
 - a. The protective steel tube shall fit over threaded rod and be at least 4" in length.
 - b. The tube shall prevent damage to cables placed in or pulled through CAT CMTM U- hooks. The tube shall not inhibit the pulling of cables.
 - c. Acceptable products: ERICO CAT-CMTM CATTBCM, or approved equal.

2.6 OUTLETS

- A. Each data outlet in a wall or floor shall be served by two (2) 27 mm (1 in.) conduits and a double-gang deep device box with a single-gang mud ring.
- B. Wall mounted telephones shall be served by one 21 mm (0.75 in.) conduit and a single-gang deep device box with a single-gang mud ring. The outlet box shall be mounted at a center height of 1220 mm (48 in.) above the finished floor, unless otherwise specified on the drawing, and shall have a clearance of 305 mm (12 in.) of wall surface on all sides.
- C. All outlet conduits shall be stubbed into accessible ceiling space.
- D. All outlet conduits shall have burrs and any other abrasive elements removed and an insulating bushing shall be installed on both ends.
- E. No section of conduit shall be longer than 30 m (100 ft.) between pull points.
- F. No more than 180 degrees of conduit bends shall be permitted between pull points.
- G. The minimum inside radius for any bend of an outlet conduit shall be six times the inside diameter of that conduit.

2.7 CONDUITS

- A. Electric metallic tubing: Comply with UL 797. Tubing shall have hot dipped galvanized exterior, enamel-coated interior.
- B. Flexible conduit shall not be used in lieu of conduit bends and offsets.
- C. PVC conduit: Comply with UL 651, listed for use with 90 degrees C conductors operating at 90 degrees C.

2.8 LABELS

- A. Shall meet the legibility, defacement, exposure and adhesion requirements of UL 969.

- B. Shall be preprinted or computer printed type. Hand written labels are not acceptable.
- C. Where insert type labels are used provide clear plastic cover over label.
- D. Equipment Room Copper, Fiber, and Coax Horizontal Cable Labels
 - 1. Panduit Part#LS7-75NL-1 or Brady#WML-317-292
- E. Work Area Copper, Fiber, and Coax Riser Cable Labels
 - 1. Panduit Part#LS7-75NL-1 or Brady #WML-317-292
- F. Patch Panel Labels
- G. Panduit Part #LS7-38-1 or Brady #CL-111-619

2.9 FIRE STOPPING

- A. In all buildings, floor/ceiling assemblies, stairs, and elevator penetrations must be sealed with a 2-hour fire stop assembly at a minimum, unless otherwise noted.
- B. Walls must be sealed with a 2-hour fire stop assembly at a minimum.
- C. Communication pathways requiring fire stopping shall utilize EZ Path fire stopping Pathways for ease of Moves, Adds, and Changes.
- D. All fire stopping penetrations shall conform to the recommended practices listed in UL1479 or ASTM.
- E. See Section 27 05 37 – Fire-stopping for Communication Systems

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The intention of the telecommunications conduits is to provide a route between ER and TR rooms, routes from the TRs throughout building floors to hallways, and routes from hallway distribution systems into rooms to individual TOs for telecommunications cabling.
- B. Installation of new pathways shall not interfere with existing pathways in such a way that installation of new cables within the existing pathway is made more difficult.

3.2 3.02 EXAMINATION

- A. Examine areas to receive cable management system. Notify the Owner's Representative of conditions that would adversely affect the installation or subsequent utilization of the system.
- B. Do not proceed with installation until unsatisfactory conditions are corrected.

3.3 INSTALLATION

- A. Install in accordance with recognized industry practices, to ensure that the equipment complies with requirements of the CEC, and applicable portions of NFPA 70B and NECA "Standards of Installation" pertaining to general electrical installation practice.
- B. Coordinate installation with other trades.
- C. Field verification is required before installation.
- D. Install cable management system at locations indicated on the drawings and in accordance with manufacturer's instructions.

3.4 IDENTIFICATION & LABELING

- A. The size, color, and contrast of all labels should be selected to ensure that the identifiers are easily read. Labels should be visible during the installation of and normal maintenance of the infrastructure.
- B. Labels should be resistant to the environmental conditions at the point of installation (such as moisture, heat, or ultraviolet light), and should have a design life equal to or greater than that of the labeled component.
- C. All labels shall be printed or generated by a mechanical device.

3.5 TELECOMMUNICATION IDENTIFIERS

- A. Refer to the University of Houston Information Technology Telecommunications Infrastructure Standards Manual for labeling practices.
- B. Outside Plant cabling shall be clearly marked using permanent means. Outside plant shall use the following system of numbering and labeling:

- 1. Fiber Optic: Identify: far-end building name, building number, fiber-type and strand-count

Label at entrance and exit points of tunnel system and at conduit entry points between 12 inches and 36 inches from the conduit or at closet point that is clearly visible and long cable length in tunnel at 200 foot intervals.

Label at termination panels at both ends.

- 2. Copper: Identify: far-end building name, building number and strand-count

Label at entrance and exit points of tunnel system and at conduit entry points between 12 inches and 36 inches from the conduit or at closet point that is clearly visible and long cable length in tunnel at 200 foot intervals.

- C. Riser cabling shall be clearly marked using permanent means. Riser cabling shall use the following system of numbering and labeling:
 - 1. Fiber Optic:

Identify: far-end EF / ER / TR, fiber-type and strand-count.

When small facilities are fed from a primary location and treated as an ER, riser shall be labeled similar to Outside Plant Fiber Optic.

2. Copper:

Identify: far-end EF / ER / TR and pair-count

Termination points shall be labeled as to actual pair at every fifth (5th) pair-point.

END OF SECTION

SECTION 27 05 37

FIRE-STOPPING FOR COMMUNICATION SYSTEMS

PART 1 – GENERAL

1.1 GENERAL

- A. Summary – (ARCHITECT SHALL VERIFY ALL MATERIALS AND PART NUMBERS)
- B. This section includes labor, materials and equipment necessary to complete the installation required for the items specified under this Section, including but not limited to:
- C. Firestopping of Through Penetrations in Fire Rated Assemblies.
- D. Smoke and Acoustical Sealing in Non-Rated Assemblies.
- E. Related Work: Consult all other Sections, determine the extent and character of related work and properly coordinate work specified herein with that specified elsewhere to produce a complete installation.

1.2 RELATED SECTIONS

- A. 27 05 26 Grounding and Bounding for Communications
- B. 27 05 28 Pathways for Communication Systems
- C. 27 05 37 Firestopping For Communications Systems
- D. 27 10 00 Structured Cabling Testing
- E. 27 13 00 Communications Copper Cable Backbone
- F. 27 13 23 ABF Fiber Optic Cabling
- G. 27 15 00 Communication Horizontal Cabling

1.3 REFERENCES

- A. ASTM E 814, "Fire Tests of Through Penetration Firestops."
- B. ANSI/UL1479, "Fire Tests of Through Penetration Firestops."
- C. ASTM E90, "Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements."
- D. Underwriters Laboratories Inc. (UL) – Fire Resistance Directory
- E. National Fire Protection Association (NFPA) – NFPA 101: Life Safety Code.
- F. CEC: California Electrical Code.

- G. ANSI/TIA-1179-2010 “Healthcare Facility Telecommunications Infrastructure Standard.”
- H. ANSI/TIA-EIA-569 “Commercial Building Standard for Pathway’s and Spaces.”

1.4 PERFORMANCE REQUIREMENTS

- A. Fire rated cable pathway devices shall be used in fire-rated construction for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:
 - 1. Meet the hourly fire-rating of fire rated wall and or floor penetrated.
 - 2. Be tested for the surrounding construction and cable types involved.
 - 3. Have UL Systems permitting cable loads from; “Zero to 100% Visual Fill.” This requirement eliminates need for fill-ratio calculations to be made by cable technicians to ensure cable load is within maximum allowed by UL System.
 - 4. Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.
 - 5. Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
 - a. Opening or closing of doors.
 - b. Spinning rings to open or close fabric liner.
 - c. Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
 - d. Furnish letter from manufacturer certifying compliance with this definition of “Zero- Maintenance.”
 - 6. Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
 - 7. Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
 - 8. Cable Pathway Devices passing vertically through floors shall have equal F & T Rating. (See UL System # F-A-3037, Item #4 “EZ-PATH Grid T-Rating Kit” Part # TRK444)
 - 9. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the

manufacturer of the device and the corresponding UL System number installed.

- B. Non rated cable pathway devices shall be used in non-fire-rated construction for ALL low- voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:
1. Limit the movement of smoke and sound of wall and or floor penetrated.
 2. Restore the STC Rating of the penetrated wall.
 3. Provide L Ratings of <1 CFM when empty and <2.5 CFM at all other loading up to 100 percent.
 4. Accommodate cable loads from; "Zero to 100% Visual Fill."
 5. Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.
 6. Be "Zero-Maintenance", zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to:
 - a. Opening or closing of doors.
 - b. Spinning rings to open or close fabric liner.
 - c. Removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.
 - d. Furnish letter from manufacturer certifying compliance with this definition of "Zero- Maintenance."
 7. Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
 8. Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.
 9. Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.
- C. As an alternate to using a fire-rated or non-rated cable pathway device for single low voltage cables (up to 0.27 in. (7 mm) O.D) penetrating one or two-hour, gypsum board/stud wall assemblies or non-rated assemblies, either as a through-penetration or as a membrane- penetration, a fire-rated cable grommet may be substituted. The product shall consist of a molded, two-piece, plenum-

rated grommet having a foam fire and smoke sealing membrane that conforms to the outside diameter of the individual cable. The grommet product shall be capable of locking into place to secure the cable penetration within the wall assembly. The grommet shall be UL Classified and tested to the requirements of ASTM E814 (UL1479) and CAN/ULC S115.

- D. Where non-mechanical pathways must be utilized, such as sealing (caulking) around single or grouped conduits, provide products that upon curing do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during or after construction. Provide letter from manufacturer certifying compliance with this section.
- E. Cable pathway shall replace conduit sleeves in walls and floors, and;
 - a. When installed individually in floors, devices shall pass through core-drilled opening utilizing tested floor plates.
 - b. When multiple units are ganged in floors, devices shall be anchored by means of a tested grid.
 - c. When installed individually in walls, devices shall pass through core drilled opening utilizing tested wall plates or integrated flanges.
 - d. When multiple units are ganged in walls, devices shall be anchored by means of a tested grid.
- F. Cable tray shall terminate at each barrier and resume on the other side such that cables pass independently through devices. Cable tray shall be properly supported on each side of the barrier.

1.5 SUBMITTALS

- A. Submit under provisions of Section 27 02 00 Communication General Requirements
- B. Product Data: Provide manufacturer's standard catalog data for specified products demonstrating compliance with referenced standards and listing numbers of systems in which each product is to be used.
- C. Schedule of UL System Drawings for Fire Rated Construction: Submit schedule of all expected opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance ratings.
- D. UL System Drawings for Fire Rated Construction: Furnish copies of all UL Systems identified in schedule above. Include any engineering recommendations.
- E. Certificates: Product Certificate of Compliance from the by manufacturer certifying material compliance with applicable code and specified performance characteristics.
- F. Installation Instructions: Submit manufacturer's printed installation instructions.

1.6 QUALITY ASSURANCE

- A. Products/Systems: Provide firestopping systems that comply with the following requirements:
- B. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop system acceptable to authorities having jurisdiction.
- C. Firestopping products bear the classification marking of qualified testing and inspection agency.
- D. Installer Qualifications: Experience in performing work of this section who is qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products in accordance with specified requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Manufacturer's original, unopened, undamaged containers, identification labels intact identifying product and manufacturer, date of manufacture; lot number; shelf life, if applicable; qualified testing and inspection agency's classification marking; and mixing instruction for multi-component products.
 - 2. Handle and store products according to manufacturer's recommendations published in technical materials. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.
- B. Storage and Protection:
 - 1. Store materials protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

1.8 PROJECT CONDITIONS

- A. Do not install products when ambient or substrate temperatures are outside limitations recommended by manufacturer.
- B. Do not install products when substrates are wet due to rain, frost, condensation, or other causes.
- C. Maintain minimum temperature before, during, and for a minimum 3 days after installation of materials.
- D. Do not use materials that contain flammable solvents.

- E. Coordinate construction of openings and penetrating items to ensure that through- penetration firestop systems are installed according to specified requirements.
- F. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- G. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Specified Technologies Inc., 200 Evans Way, Somerville, NJ 08876. Tel: (800) 992-1180, Fax: (908) 526-9623, Email: techserv@stifirestop.com, Website: www.stifirestop.com.
- B. Substitutions: Subject to approval of NOCCCD. Must be submitted prior to award of Bid.
- C. Single Source: Obtain firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

2.2 MATERIALS

- A. General: Use only products that have been tested for specific fire resistance rated construction conditions or acoustical and smoke related requirements conforming to construction assembly type, penetrating item type, annular space requirements, and rating involved for each separate instance.
- B. Firestop Sealants: STI SpecSeal® Brand single component latex formulations that upon cure do not re-emulsify during exposure to moisture, the following products are acceptable:
 - 1. Specified Technologies Inc. (STI) SpecSeal® Series SSS Sealant
 - 2. Specified Technologies Inc. (STI) SpecSeal® Series LCI Sealant
- C. Firestop Putty: STI SpecSeal® Brand intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds, the following products are acceptable:
 - 1. Specified Technologies Inc. (STI) SpecSeal® Series SSP Putty
- D. Firestop Pillows: STI SpecSeal® Brand re-enterable, non-curing, mineral fiber core encapsulated on six sides with intumescent coating contained in a flame retardant poly bag, the following products are acceptable:
 - 1. Specified Technologies Inc. (STI) SpecSeal® Series SSB Pillows

- E. Fire-Rated Cable Grommet: STI SpecSeal® Brand Firestop Grommet is a molded, two-piece grommet with an integral fire and smoke sealing foam membrane for sealing individual cable penetrations through framed wall assemblies. Grommet snaps together around cable and locks tightly into the wall.
 - 1. Specified Technologies Inc. (STI) SpecSeal® Brand Ready® Firestop Grommets; RFG1
- F. Fire-Rated Cable Pathways: STI EZ-PATH® Fire-Rated Pathway device modules comprised of steel pathway with self-adjusting intumescent foam pads allowing 0 to 100 percent cable fill, the following products are acceptable:
 - 1. Specified Technologies Inc. (STI) EZ-PATH® Fire Rated Pathway
- G. Smoke and Acoustical Pathways: STI EZ-PATH® Smoke & Acoustical Pathway device module comprised of a nonmetallic pathway with integral self-adjusting smoke and sound sealing system for cable penetrations through non-fire-resistance rated wall or floor assemblies, the following products are acceptable:
 - 1. Specified Technologies Inc. (STI) EZ-PATH® Smoke & Acoustical Pathway; Model No. NEZ33

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before beginning installation, verify that substrate conditions previously installed under other sections are acceptable for installation of firestopping in accordance with manufacturer's installation instructions and technical information.
- B. Surfaces shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellants, and any other substances that may inhibit optimum adhesion.
- C. Provide masking and temporary covering to protect adjacent surfaces.
- D. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install systems in accordance with Performance Criteria and in accordance with the conditions of testing and classification as specified in the published design.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of products.

3.3 FIELD QUALITY CONTROL

- A. Keep areas of work accessible until inspection by authorities having jurisdiction.
- B. Where deficiencies are found, repair firestopping products so they comply with requirements.

3.4 ADJUSTING AND CLEANING

- A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed openings to be free of excess firestopping materials and soiling as work progresses.

3.5 SCHEDULES

Penetrant Type	Concrete Floor	Concrete Wall	Gypsum Board Wall
Blank Opening	C-AJ-0100, C-AJ-0101, C-AJ-0113, C-AJ-0116	C-AJ-0100, C-AJ-0101, C-AJ-0113, C-AJ-0116	W-L-0020, W-L-0034
Metal Conduits	C-AJ-1080, C-AJ-1240, C-AJ-1353	C-AJ-1080, W-J-1098, W-J-1100	W-L-1049, W-L-1222, W-L-1168
Plastic Conduits/ Raceways	C-AJ-2140, C-AJ-2292, F-A-2186, F-A-2210, F- A-2225	C-AJ-2038, C-AJ-2108, C-AJ-2578, C-AJ-2586, W-J-2018, W-J-2076	W-L-2059, W-L-2074, W-L-2093, W-L-2241
Cables	C-AJ-3214, C-AJ-3231, F-A-3015, F-A-3021, F- A-3054	C-AJ-3214, C-AJ-3231, W-J-3098, W-J- 3099, W-J-3124, W-J- 3150, W-J-3180	W-L-3219, W-L-3248, W-L-3287, W-L-3356, W-L-3377, W-L-3378, W-L-3379, W-L-3390

3.6 DOCUMENTATION

Penetrant Type	Concrete Floor	Concrete Wall	Gypsum Board Wall
Cable Trays	C-AJ-3317, C-AJ-8181, C-AJ-4029, F-A-3015, F-A-3037	C-AJ-8181, W-J-4021, W-J-4022, W-J-4033, W-J-3098, W-J-3145, W-J-3158	W-L-3218, W-L-3271, W-L-3286, W-L-3306, W-L-4008, W-L-4029, W-L-4043, W-L-8073

- A. Place system stickers on each side of wall penetrations.
- B. Place a reproduction (photo copy) of the UL System description in a document protector and mount to the wall next to the wall penetration.
- C. Highlight the section of the system description that list the allowed cable types.

END OF SECTION

SECTION 27 10 00

STRUCTURED CABLING TESTING

PART 1 – GENERAL

- A. Transmission performance of structured cabling varies with length, connecting hardware, cords and total number of connections. The installer must take care to properly install the cabling components. To ensure that the installed structured cabling solution meets or exceeds the required performance it must be 'tested' or 'certified'.
1. The requirements for each category of cabling (Cat6A) and optical fiber optics links are located in the ANSI/TIA-568 series standards.
 2. Test equipment must meet the requirements set forth in the ANSI/TIA-568 series Standard for Field Test Equipment.
 3. All Copper testers shall be Level III. All fiber testers shall meet the requirements in ANSI/TIA-568.
- Field Power Meters shall meet the following: Accuracy ± 0.2 dB
- Resolution 0.01 dB
- Precision ± 0.15 dB
- The Field light source shall meet the following: Accuracy ± 0.01 dB
- Wavelength 850 ± 30 nm
- 1300 ± 50 nm
- 1310 ± 30 nm
- 1550 ± 0 nm
- B. The calibration on all test equipment shall be current.
- C. The software in all test equipment shall be current.
- D. Manufacturers
1. The following manufacturer's testers are approved.
 2. FLUKE

3. DTX1800
4. OptiFiber OTDR
5. DTX-CLT CertiFiber Optical Loss Test Set
6. IDEAL
7. LanTEK II
8. LANTEK 6/6A/7G
9. FIBERTEK
10. Or other test equipment approved by NOCCCD

E. Systems Testing and Documentation.

- 1.
2. Provide installation testing of equipment where required by manufacturer's installation instructions.
3. Provide complete end to end testing for all copper and fiber optic systems/channels based on latest applicable standards. Document all testing and submit with final as-built submittal package.
4. For all controls and operating equipment, submit equipment/systems to at least three complete operational sequences, in which all equipment operations are tested, observed, and verified.
- 5.
6. Prior to substantial completion and project acceptance inspection, submit test reports to indicated scope of startup and operational tests, with results of testing for each specified operation.

F. Copper Cabling System Testing

1. General: Copper cabling shall be tested and certified after installation as follows and as required for cable manufacturer's warranty. Twisted-pair copper cable channels shall be tested for continuity as specified below, presence of ac/dc voltage, and performance. All cabling shall be tested for conformance to horizontal cable specifications as outlined herein, and shall be tested according to test set manufacturer's instructions utilizing latest firmware and software. Testing shall include all of electrical parameters as specified under Product. All cables and termination hardware shall be 100 percent tested by installation contractor for defects in installation and to verify cable performance under installed conditions. All conductors of each installed cable shall be verified useable

by Contractor prior to system acceptance. All cables shall be tested according to contract documents, manufacturer's warranty provisions, and best industry practices. If any of these are in conflict, Contractor shall comply with most stringent requirements. All defects in cabling system installation shall be repaired or replaced in order to ensure 100 percent useable conductors in all cables installed, at no additional cost to Owner.

2. Continuity: Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. The test shall be recorded as pass/fail as indicated by test unit according to manufacturers' recommended procedures, and referenced to appropriate cable identification number and circuit or pair number. Any faults in wiring shall be corrected and cable re-tested prior to final acceptance.
3. Length: Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to maximum distances set forth in TIA/EIA-568-C standards and all other applicable standards specified in Appendix 1: Codes, Standards, and Informative References. Cable lengths shall be recorded, referencing cable identification number and circuit or pair number. For multi-pair cables, shortest pair length shall be recorded as length for cable.
4. Factory testing: Every reel of cable shall be tested by cable manufacturer for all characteristics specified for cable type in this section. This testing shall be performed using a sweep test method and include frequencies specified for cable. A test report shall be available electronically, at no additional cost, for a minimum of five (5) years from the date of manufacture. The test report shall include the reel number, the date of the test, the Lot number, and test results for Return Loss (RL), Insertion Loss (Attenuation), Pair-to-Pair NEXT, and Power Sum NEXT Pair-to-Pair ELFEXT and Power Sum ELFEXT. The test report shall show the "Worst Case Margin" for the listed transmission characteristics.
5. Test results: Test results shall be automatically evaluated by equipment, using most up-to-date criteria from TIA/EIA-568-C standards and all other applicable standards specified in Appendix 1: Codes, Standards, and Informative References, and result shown as pass/fail. Test results shall be printed directly from test unit or from a download file using an application from test equipment manufacturer. The printed test results shall include all tests performed, expected test result and actual test result achieved.

6. Test reports: Test reports for all factory testing and field test reports for copper cabling installation shall be submitted to the Owner's Representative and manufacturer prior to commissioning voice and data system and final contract payment. Refer to Submittals in this Section.

G. Optical Fiber Cable Testing

1. General: Optical fiber cabling shall be tested and certified after installation as described below and as required for cable manufacturer's warranty. Fiber testing shall be performed on all fibers in completed end to end system. Testing shall consist of a bi-directional end to end test in accordance with applicable standards or a bi-directional end to end test performed by EIA/TIA-455-53A and all other applicable standards. The system loss measurements shall be provided at 850 and 1300 nanometers for multimode type glass and 1310 and 1550 nanometers for single-mode type glass. These tests shall also include continuity checking of each fiber. For spans greater than 90 meters, each tested span must test to a value less than or equal to value determined by calculating a link loss budget. For horizontal spans less than or equal to 90 meters, each tested span must be less than or equal to 2.0 decibels. The insertion loss for each mated optical fiber connector pair shall not exceed 0.40 decibels.
2. Pre-installation testing: Test all optical fiber cable for all fibers prior to installation of cable.
3. Performance testing: Where links are combined to complete a circuit between devices, Contractor shall test each link from end to end to ensure performance of system. Only a basic link test is required. Contractor can optionally install patch cords to complete circuit and then test entire channel. The test method shall be same used for test described above. The values for calculating loss shall be those defined in applicable TIA/EIA standards in Appendix 1: Codes, Standards, and Informative References.
4. Attenuation testing: Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach test equipment to cable plant. The light source shall be left in place after calibration and power meter moved to far end to take measurements.
5. Loss budget: All fiber cabling shall be tested at both wavelengths 850 nm and 1310 nm for multimode and 1300 nm and 1550 nm for single mode.
6. The link attenuation shall be calculated using:
 - a. The CommScope link Loss Calculator for CommScope installations

- b. The following calculation for other installations:
- Link Attenuation Allowance (dB) + Cable Attenuation (dB) +
Connector loss (dB)
- = Splice Insertion Loss (dB) Where:
- Cable attenuation (dB) = Cable attenuation (dB/km) X Length (km)
- Connector loss (dB) = Number of Connector pairs X Allowable
connector loss (dB) Splice Insertion Loss (dB) = Number of
Splices X Allowable Splice loss (dB)
7. Link loss: A mated connector to connector interface shall be considered a single connector. Loss numbers for installed link shall be calculated by taking sum of bi- directional measurements and dividing that sum by two. All links not meeting requirements of standard shall be brought into compliance by Contractor, at no additional cost to Owner.
8. Documentation: Following final documentation shall be submitted to the owner's representative prior to commissioning data system and final contract payment according to Submittals in this section.
9. Test results: Test results shall be automatically evaluated by equipment, using most up- to-date criteria from all applicable standards and result shown as pass/fail. Test results shall be printed directly from test unit or from a download file using an application from test equipment manufacturer. The printed test results shall include all tests performed, expected test result and actual test result achieved.
10. End to End Loss Data: final documentation shall be submitted to the owner's representative.
- H. As Installed/ As Built Diagrams: Final documentation shall be submitted to the owner's representative.
- I. Test Documentation
1. Electronic Format – One electronic copy of the Test Reports shall be provided.
2. Certification Test Reports shall be submitted in electronic format using the appropriate software supplied by the test equipment manufacturer. The data format should be that of the test report software (i.e. *.flw files for

Fluke). The contractor shall provide any necessary software to view and evaluate the test data.

3. The following list is provided as a reference:
4. Tester Test Report Software
5. Fluke LinkWare
6. Ideal LanTek Reporter
7. Provide test documentation in 3-ring binders within 2 weeks after completion of project testing. Binders shall be clearly marked on outside front cover and spine with words Test Results, project name, and date of completion (month and year). Major heading tabs, Horizontal and Backbone, shall divide binder. Each major heading shall be further sectioned by test type. Within horizontal and backbone sections, divide by tabs scanner test results by category, optical fiber attenuation test results, and continuity test results. Present test data within each section in sequence listed in administration records.
8. Provide test equipment by name, manufacturer, model number and last calibration date at the end of document. Unless manufacturer specifies more frequent calibration cycle, annual calibration cycle shall be required on all test equipment used for this installation.
9. Test document shall detail test method used and specific settings of equipment during test. Scanner tests shall be printed on 8 1/2 by 11 inches. Hand written test results (attenuation results and continuity results) shall be documented on a suitable test form.
10. When repairs and re-tests are performed, note problem found and corrective action taken, and collocate in binder both failed and passed test data.

END OF SECTION

SECTION 27 15 00

HORIZONTAL CABLING

PART 1 – GENERAL

WORK INCLUDES

Provide all labor, materials, and equipment for the complete installation of all Copper Horizontal Cabling applications called for in the Bid Documents.

1.1 SCOPE OF WORK

- A. This section includes the minimum requirements for Copper Horizontal Cables.
- B. Horizontal (to desktop) cable shall consist of Category 6A copper cable for all Data and Voice applications.
- C. At corporate, engineering and campus facilities, horizontal cabling to typical work area outlets (including offices, cubicles and conference rooms) shall consist of four 6A cables serving each outlet.
- D. Outlets for wall-mounted or other “telephone only” installations shall consist of one 6A cable as a minimum.
- E. Outlets for wireless access points (APs) shall consist of two 6A cables as a minimum with a 1 meter maintenance loop.

1.2 QUALITY ASSURANCE

- A. All cable and equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative.
- B. Equipment and materials shall be of the quality and manufacture indicated. The equipment specified is based upon the acceptable manufacturers listed. Where “approved equal” is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.
- C. Strictly adhere to all Building Industry Consulting Service International (BICSI), Electronic Industries Alliance (EIA) and Telecommunications Industry Association (TIA) recommended installation practices when installing communications/data cabling.
- D. Material and work specified herein shall comply with the applicable requirements of the current adopted revision of the following:
 - a. ANSI/TIA – 568 Series Commercial Building Telecommunications Cabling Standard, TIA – 569 Commercial Building Standard for Telecommunications Pathways and Spaces,
 - b. ANSI/TIA – 606 Administration Standard for the Telecommunications Infrastructure of Commercial Buildings

- c. ANSI-J-STD – 607 Joint Standard for Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
- d. CEC – California Electric Code
- e. BICSI – Telecommunications Distribution Methods Manual
- f. TIA/EIA-568-C.1 – Commercial Building Telecommunications Cabling Standard TIA/EIA-568-C.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards
- g. ISO/IEC 11801 - Generic Cabling for Customer Premises CENELEC EN-50173 - Generic Cabling Systems

1.3 CABLE CONSTRUCTION (BY TYPE)

- A. Listed CMR cable: Solid copper conductors with high-density polyolefin insulation and an overall low smoke polyvinyl chloride (PVC) jacket to achieve a riser (i.e., non-plenum) rating by applicable CEC requirements.
- B. Listed CMP cable: Solid copper conductors with fluorinated ethylene propylene (FEP)/polyolefin insulation and an overall low smoke PVC jacket to achieve plenum rating by applicable CEC requirements.
- C. LSZH cable: Solid copper conductors with polyolefin insulation and a low smoke-zero halogen (LSZH), compound jacket to achieve a LSZH rating by applicable IEC standards.
- D. LC cable: Solid copper conductors with FEP fluoropolymer insulation and overall FEP fluoropolymer jacket to achieve CMP 50 rating by UL standards
- E. OSP outdoor cable rated for wet locations: Solid copper conductors with polyolefin insulation, polyolefin fluted center member with flooding compound, and black polyethylene jacket.
- F. Comply with following general physical specifications:
- G. Maximum pulling tension: 110 Newton's (25 pound-force)
- H. Operating temperature: -20 to 60 degrees C [-4 to 140 degrees F]

PART 2 - PRODUCTS

2.1 DATA COMMUNICATIONS HORIZONTAL CABLING (CATEGORY 6A/CLASS EA)

- A. Category 6 Augmented (6A)/Class EA Unshielded Twisted-Pair (UTP) Cable
- B. All Cables shall be of round construction
- C. Each cable shall contain 4 color coded pairs
- D. Basis for Design Specifications: CommScope Sysitmax Ultra 10® U/UTP Twisted Pair Cable. Substitutions are not acceptable.

- E. Cable shall be listed for the environment where it will be installed (Plenum, Riser, LSZH, etc.)
- F. Approved Manufacturer: CommScope Systimax Catalog/Manufacturer Part Number
- G. (Provide Approved Materials List and Part Number Here)
- H. Category 6A horizontal cabling shall meet or exceed the performance specifications:

Electrical Specifications	
ANSI/TIA Category	6A
dc Resistance Unbalance, maximum	4%
dc Resistance, maximum	8.00 ohms/100 m
Mutual Capacitance	6.0 nF/100 m @ 1 kHz
Nominal Velocity of Propagation (NVP)	0.65
Operating Frequency, maximum	500 MHz
Transmission Standards	ANSI/TIA-568-C.2
Safety Voltage Rating	300 V
Dielectric Strength, minimum	1500 Vac 2500 Vdc

Environmental Specifications	
Environmental Space	Non-plenum, Plenum
Flame Test Method	CMR, CMP, LSZH
Installation Temperature	0 °C to +60 °C (+32 °F to +140 °F)
Operating Temperature	-20 °C to +60 °C (-4 °F to +140 °F)

General Specifications	
Brand	CommScope Systimax
Cable Component Type	Horizontal
Cable Type	U/UTP (unshielded)
Pairs, quantity	4
Jacket Color	Blue
Conductor Gauge, singles	23 AWG
Conductor Type, singles	Solid
Conductors, quantity	8
Separator Type	Bisector
Packaging Type	Reel
Product Number	10G4, 10GN4, 10GNZH

Mechanical Specifications	
Pulling Tension, maximum	11 g 25 lb

Category 6A horizontal cabling shall meet or exceed the performance specifications listed in the following table when installed in a 4 connector Channel.

Guaranteed Performance Specifications for 4-Connection Ultra 10 UTP Channels		
Electrical Parameter	Guaranteed Channel Margins to Amendment 1 to ISO/IEC 11801:2002 "Class E" (1-250MHz)	Guaranteed Channel Margins to Draft ISO/IEC 11801 Edition 2.1 "Class E _A " (1-250MHz)
Insertion loss	5%	2%
NEXT	6 dB	1 dB
PSNEXT	7.5 dB	2.5 dB
ACR-F	6 dB	6 dB
PSACR-F	8 dB	8 dB
Return Loss	3 dB	> 0 dB
PSANEXT, PSAACR-F, PSANEXT avg, PSAACR-F avg	N/A	> 0 dB

Insertion Loss margin is calculated based on 12m of 95 series cordage and 88m of 91A series cable plus 4 connections. If the total cord length in a 100m channel has to be greater than 12m, please refer to GigaSPEED X10D Design and Installation Guidelines for the instruction on how to scale cable and cord length properly.

Guaranteed Channel Performance Specifications for 4-Connection Ultra 10 UTP Systems														
Freq (MHz)	Insertion Loss (dB)	PS ANEXT (dB)	Avg. PS ANEXT (dB)	PS AACR-F (dB)	AVG. PS AACR-F (dB)	NEXT (dB)	ACR-N (dB)	PS NEXT (dB)	PS ACR-N (dB)	ACR-F (dB)	PS ACR-F (dB)	Return Loss (dB)	Delay (ns)	Delay Skew (ns)
1.0	3.8	67.0	69.3	67.0	71.0	71.0	68.9	69.5	67.4	69.3	68.3	22.0	580	40
4.0	4.0	67.0	69.3	65.0	69.0	69.0	65.0	68.0	64.0	57.2	56.2	22.0	562	40
8.0	5.6	67.0	69.3	58.9	62.9	64.2	58.5	63.1	57.5	51.2	50.2	22.0	557	40
10.0	6.3	67.0	69.3	57.0	61.0	62.6	56.3	61.5	55.2	49.3	48.3	22.0	555	40
16.0	7.9	67.0	69.3	52.9	56.9	59.2	51.3	58.1	50.2	45.2	44.2	18.9	553	40
20.0	8.9	67.0	69.3	51.0	55.0	57.6	48.7	56.5	47.6	43.2	42.2	19.0	552	40
25.0	10.0	66.0	68.3	49.0	53.0	56.0	46.1	54.8	44.9	41.3	40.3	19.1	551	40
31.25	11.2	65.1	67.4	47.1	51.1	54.4	43.3	53.2	42.1	39.3	38.3	19.2	550	40
62.5	15.9	62.0	64.3	41.1	45.1	49.4	33.4	48.1	32.2	33.3	32.3	17.0	549	40
100.0	20.4	60.0	62.3	37.0	41.0	45.9	25.6	44.6	24.2	29.3	28.3	15.0	548	40
200.0	29.4	55.5	57.8	31.0	35.0	40.8	11.4	39.4	10.0	23.2	22.2	12.0	547	40
250.0	33.1	54.0	56.3	29.0	33.0	39.1	6.0	37.7	4.5	21.3	20.3	11.0	546	40
300.0	36.5	52.8	55.1	27.5	31.5	32.7	-3.8	31.3	-5.3	19.7	18.7	7.2	546	40
400.0	42.7	51.0	53.3	25.0	29.0	30.6	-12.2	29.1	-13.7	17.2	16.2	6.0	546	40
500.0	48.3	49.5	51.8	23.0	27.0	28.9	-19.4	27.3	-21.0	15.3	14.3	6.0	546	40

The table provides reference values only. All parameters comply with the governing equations over the entire frequency range.

All values and equations apply to worst-case channels utilizing four-pair Sysitmax Ultra 10 series cables with full cross-connects, consolidation points and work area outlets (4 connections in a channel) for the length up to 100 meters.

2.2 COMMUNICATIONS FIBER CONNECTORS, ADAPTERS AND ADAPTER PANELS

- A. All products will be:
 - a. Compliant to RoHS 2002/95/EC
- B. Designed, manufactured and/or distributed under this quality management system: ISO 9001:2008

2.3 SINGLE-MODE ADAPTER FOR USE WITH G.652.D OR G652.D, OS2 FIBER

- A. Color – Blue
- B. Alignment Sleeve Material
- C. Simplex/Duplex - Phosphorous bronze
- D. Multiport - Zirconia
- E. Basis for Design Specifications: CommScope SFA-SC fiber adapter product series for Single-mode OS1 and OS2 fiber.
- F. Approved Manufacturer: CommScope

2.4 SINGLE-MODE CONNECTOR FOR USE WITH G.652.D OR G.652.D, OS2 FIBER

- A. Color – Blue
- B. Ferrule Geometry - Pre-radiused
- C. Ferrule Material - Zirconia
- D. Performance meets or exceeds ANSI/TIA/EIA-568-C.2 standard
- E. Insertion Loss, typical - 0.30 dB
- F. Return Loss, minimum - 55.0 dB
- G. Insertion Loss Change, mating - 0.30 dB
- H. Insertion Loss Change, temperature - 0.30 dB
- I. Basis for Design Specifications: CommScope SFC-SCR fiber connector product series for Single-mode OS1 and OS2 fiber types.
- J. Approved Manufacturer: CommScope

2.5 FACEPLATES AND SURFACE MOUNT BOXES (SMB)

- A. Universal design that accommodates CommScope information outlets.
- B. Modular design that supports voice, data, audio and video applications.

- C. Supports cable/port labeling.
- D. Available in four different colors – white, black, ivory and gray.
- E. Basis for Design Specifications: CommScope Flexible Faceplates and Surface Mount Boxes
- F. Approved Manufacturer CommScope Sysitmax

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Contractor shall comply applicable codes, standards and with all local codes and requirements. It is the responsibility of the contractor to identify and adhere to any unique codes or requirements governed by the region where the work is to be performed.
- B. Cable shall be installed following industry standard practices.
- C. Horizontal cabling shall be installed from the work area outlet location to the nearest Tele-communications Space.
- D. Horizontal cabling shall be terminated on a patch panel in the telecommunication space which is the same category rating as the Cable. i.e. Cat 6A cable terminates on Cat 6A panels.
- E. Contractor shall not exceed the maximum pulling tension or the minimum bending radius for twisted pair cables per manufacturer's specifications.
- F. Contractor shall test all horizontal links per the ANSI/TIA-568 Requirements.

END OF SECTION

SECTION 28 01 00

ADDRESSABLE FIRE-ALARM SYSTEMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section. This specification is meant to compliment the entire contract documents, including but not limited to manuals, cut sheets, drawings, RFI response, addendums and bulletins.

1.02 Scope

- A. Systems components shall be Simplex and compatible with the existing system. **Substitutions are not acceptable.** Existing Fire Alarm Control Panel is Simplex model 4020 (contractor to review control panel prior to submitting and ordering equipment).
- B. This section of the specification includes the furnishing, installation, and connection of an intelligent reporting, microprocessor controlled, addressable, fire detection and emergency voice alarm communication system. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciators, power, and voice.
- C. This specification document provides the requirements for the installation, programming and configuration of a complete digital protocol addressable fire alarm system. This system shall include, but not be limited to, system cabinet, power supply, built in Signaling Line Circuit (SLC), annunciator, six programmable circuits, built in dual line Digital Communicator associated peripheral devices, batteries, wiring, conduit and other relevant components and accessories required to furnish a complete and operational Life Safety System.
- D. The system shall be an active/interrogative type system where each addressable device is repetitively scanned, causing a signal to be transmitted to the main fire alarm control panel (FACP) indicating that the device and its associated circuit wiring is functional. Loss of this signal at the main FACP shall result in a trouble indication as specified hereinafter for the particular input.
- E. The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones, and shall include provisions for the system operator to override automatic messages system wide or in selected zones.

- F. Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.
- G. The fire alarm system devices shall be manufactured by an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

1.03 Work Included

A. General Requirements

The contractor shall furnish and install a complete 24 VDC, electrically supervised, analog addressable fire alarm system as specified herein and indicated on the drawings. The system shall include but not be limited to all control panels, power supplies, initiating devices, audible and visual notification appliances, alarm devices, and all accessories required to provide a complete operating fire alarm system.

B. Listings

All fire alarm system equipment shall be listed for its intended purpose and be compatibility listed to assure the integrity of the complete system.

1.04 REFERENCES

- A. All work and materials shall conform to all applicable Federal, State and local codes and regulations governing the installation.
- B. Fire alarm system, equipment, installation, and wiring materials and methods used shall comply with the following codes and standards:
 - 1. System components proposed in this specification shall be UL listed for its intended use.
 - 2. California State Fire Marshall Listed Components.
 - 3. California Code of Regulations (C.C.R) applicable codes listed on the drawings and specifications.

1.05 BUILDING CODES and STANDARDS

- A. Apply latest adopted versions of all codes and standards unless these specifications stipulate a specific version
- B. National Fire Protection Association (NFPA):
 - 1. NFPA-72 National Fire Alarm Code
 - a. Chapter 12 - Emergency Communications ROP-568 shall be applied to this project as if it were part of the approved NFPA-72.
 - 2. NFPA 101 Life Safety Code
 - 3. CBC California Building Code

4. CFC California Fire Code
 5. CMC California Mechanical Code
 6. CEC California Electrical Code
- C. National Electrical Manufacture's Association (NEMA)
- D. Underwriters Laboratories, Inc. (UL)
1. UL-864 Edition) Control Units for Fire Protective Signaling Systems (9th Edition)
 2. UL-268 Smoke Detector for Fire Protective Signaling Systems
 3. UL-268A Smoke Detectors for Duct Applications
 4. UL-521 Heat Detectors for Fire Protective Signaling Systems
 5. UL-464 Audible Signaling Appliances
 6. UL-1971 Signaling Devices for the Hearing Impaired
 7. UL-38 Manually Actuated Signaling Boxes
 8. UL-1480 Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
 9. UL-1481 Power Supplies for Fire Protective Signaling Systems
 10. UL-1638 Signaling Appliances – Private Mode Emergency and General Utility Signaling
 11. UL 2572 Control and Communication Units for Emergency Voice/Alarm Communication (EVAC) Systems
 12. Note control equipment that is not dually UL 864 and 2572 listed are not acceptable.

1.06 General Requirements

- A. Manufacturers/Distributors Services:
1. The following supervision shall be provided by a factory trained service technician from the distributor of the fire alarm equipment. The technician shall be trained and shall have a minimum of (5) years of service experience in the fire alarm industry. The technicians name shall appear on equipment submittals and a copy of his manufactures trained shall be sent to the project engineer. The technician shall be responsible for the following items:

- a. A pre-installation visit to the job site to review equipment submittals and to verify the method by which the system is to be wired.
 - b. During the installation the certified technician shall be on site or make periodic visits to verify installation and wiring of the system. He shall also supervise the completion of conduit rough, wires pulled into conduit and wiring rough, and ready for trim.
 - c. Upon completion of wiring, final checkout and certification of the system shall be made under the supervision of this technician.
 - d. At the time of the formal checkout, technician shall give operational instructions to the owner and or his representative on the system.
- B. Owner Approval
1. Fire alarm, signal, and control equipment shall be reviewed by the Architect / Engineer / Engineer, in addition to other required approvals. Fire alarm system shall pass State of California Regulation 4 test administered by the Owner.
 2. Certification: Installation of fire alarm system shall not start until Shop Drawings, including State Fire Marshal listing numbers of fire alarm components, are submitted through the Architect / Engineer, and approved by DSA. Written certification by fire alarm equipment distributor or manufacturer shall be submitted to the Architect / Engineer and DSA, stating the system and its component parts are as approved and listed by the State Fire Marshal and that installation conforms to requirements set forth in CBC.
 3. Equipment and services described in this section represent those supplied and supported by the Manufacturer(s) listed on the drawings, unless noted otherwise.
- C. Qualifications
1. Contractor shall hold a current certification as a Simplex partner.
 2. Contractor shall be currently licensed in good standing by the California Contractors' State License Board and have qualified personnel and/or subcontractors for each discipline required for the full scope of work. A C-16 license is a minimum requirement.
 3. Contractor shall hold a valid State of California, Division of Apprenticeship Standards (DAS), Fire/Life Safety Technical Certification.
- D. Submittals

The contractor shall submit a digital submittal with searchable PDFs. Scanned documents will not be accepted. Submit documentation within thirty (30) calendar days after award of the purchase order. Indicated in the document will be the type, size, rating, style, catalog number, manufacturers names, photos, and /or catalog data sheets for all items proposed to meet these specifications. The proposed equipment shall be subject to the approval of the Architect / Engineer and no equipment shall be ordered or installed on the premises without that approval. All equipment and devices on the shop drawings to be furnished under this contract shall be clearly marked in the specification sheets.

- E. Suppliers' qualifications shall be submitted indicating years in business, service policies, warranty definitions, NICET certification, Contractor Licenses, Simplex partner certification, DAS Certification, and completion of factory training program and a list of similar installations.
- F. Contractor qualifications shall be supplied indicating years in business and prior experience with installations that include the type of equipment that is to be supplied.
- G. The installing company shall employ NICET (minimum Level II Fire Alarm Technology) technicians on site to guide the final check-out and to ensure the systems integrity.

The contractor shall provide hourly Service Rates, performed by a factory trained technician for this installed Life Safety System with the submittal. Proof of training and authorization shall be included with the submittal. These hourly service rates shall be guaranteed for a 1-year period.

- H. Contract close-out Submittals

Deliver digital and two (2) copies of the following to the owner's representative within Thirty (30) days of system acceptance. The closeout submittals shall include:

- 1. Installation and Programming manuals for the installed Life Safety System.
- 2. Point to point diagrams of the entire Life Safety System as installed. This shall include all connected Smoke Detectors and addressable field modules.
- 3. All drawings must reflect device address as verified in the presence of the engineer and/or end user.

- I. Warranty

Warranty all materials, installation and workmanship for a one (1) year period, unless otherwise specified. A copy of the manufacturer warranty shall be provided with the close out documentation.

- J. Approvals:

The system shall have proper listing and/or approval from the following nationally recognized agencies:

UL Underwriters Laboratories Inc

The Fire Alarm Control Panel and all transponders shall meet the modular listing requirements of Underwriters Laboratories, Inc. Each subassembly, including all printed circuits, shall include the appropriate UL modular label. This includes all printed circuit board assemblies, power supplies, and enclosure parts. Systems that do not include modular labels may require return to the factory for system upgrades and are not acceptable.

K. Products

This Life Safety System Specification must be conformed to in its entirety to ensure that the installed and programmed Life Safety System will accommodate all the requirements and operations required by the building owner. Any specified item or operational feature not specifically addressed prior to the bid date will be required to be met without exception.

Submission of product purported to be equal to those specified herein will be considered as possible substitutes only when all the following requirements have been met:

1. Any deviation from the equipment, operations, methods, design or other criteria specified herein must be submitted in detail to the specifying Architect / Engineer a minimum of ten (10) working days prior to the scheduled submission of bids. Each deviation from the operation detailed in these specifications must be documented in detail, including page number and section number, which lists the system function for which the substitution is being proposed.
2. Complete list of such substituted products with three (3) copies of working drawings thereof shall be submitted to the approved Architect / Engineer not less than ten (10) working days prior to the scheduled submission of bids.
3. The contractor or substitute bidder shall functionally demonstrate that the proposed substitute products are in fact equal in quality and performance to those specified herein.

L. General Equipment and Materials Requirements

All equipment furnished for this project shall be new and unused. All components shall be designed for uninterrupted duty. All equipment, materials, accessories, devices and other facilities covered by this specification or noted on the contract drawings and installation specification shall be best suited for the intended use and shall be provided by a single manufacturer. If any of the equipment provided under this specification is provided by different manufacturers, then that equipment shall be "Listed" as to its compatibility by Underwriters Laboratories (UL), if such compatibility is required by UL standards.

M. Satisfying the Entire Intent of these Specifications

It is the contractor's responsibility to meet the entire intent of these specifications.

Deviations from the specified items shall be at the risk of the contractor until the date of final acceptance by the Architect / Engineer, engineer, and owner's representative.

All costs for removal, relocation, or replacement of a substituted item shall be at the risk of the electrical contractor.

N. CONDUIT AND WIRE

1. Conduit:

- a. Conduit shall be in accordance with NFPA 72, California Electrical Code (CEC), California Fire Code (CFC) and California State Fire Marshall (CSFM).
- b. All wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross-sectional area where three or more cables are contained within a single conduit.
- c. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per CEC Article 760-29.
- d. Wiring for 24-volt control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
- e. Conduit shall not enter the fire alarm control panel or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the FACP manufacturer.
- f. Conduit shall be 3/4 inch minimum for interior spaces and 1" minimum underground.

2. Wire

- a. All fire alarm system wiring must be new.
- b. Wiring shall be in accordance with NFPA 72, California Electrical Code (CEC), California Fire Code (CFC), California State Fire Marshall (CSFM) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for initiating device circuits and signaling line circuits, and 14 AWG (1.63 mm) for notification appliance circuits.

- c. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system. All cables installed exterior and underground shall be UL listed for wet location and rated per UL requirements. All underground conductors shall be West Penn “Aqua Seal” rated or equal approved by College.
 - d. Wire and cable not installed in conduit shall have a fire resistance rating suitable for the installation as indicated in CEC (e.g., FPLR).
 - e. The system shall permit the use of IDC and NAC wiring in the same conduit with the multiplex communication loop.
 - f. All field wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, removal of any internal modules, or any open circuits in the field wiring; a trouble signal will be activated until the system and its associated field wiring are restored to normal condition.
 - g. All analog voice speaker and analog telephone circuits shall use twisted/shielded pair to eliminate cross talk.
- O. TERMINAL BOXES, JUNCTION BOXES AND CABINETS:
- 1. All boxes and cabinets shall be UL listed for their intended purpose.
 - 2. Initiating circuits shall be arranged to serve like categories (manual, smoke, water flow). Mixed category circuitry shall not be permitted except on signaling line circuits connected to intelligent reporting devices.
 - 3. The fire alarm equipment shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold-water pipe or grounding rod.

PART 2 - PRODUCTS

2.01 GENERAL

A. System Wiring

The Signaling Line Circuit (SLC) and Data Communication Bus (S-BUS) shall be wired with standard CEC 760 compliant wiring, no twisted, shielded or mid capacitance wiring is required for standard installations. All FACP screw terminals shall be capable of accepting 14-18 AWG wire. All system wiring shall be in accordance with the requirements of the California Electrical Code (CEC) and also comply with article 760 of the CEC.

B. Signaling Line Circuits

Each SLC shall be capable of a wiring distance of 10,000 feet from the SLC driver module (5815XL) and be capable of supporting 99 detectors and 99 addressable module devices. The communication protocol to SLC devices must be digital. Any SLC loop device, which goes into alarm, must interrupt the polling cycle for priority response from the FACP. The FACP must respond consistently to a device that goes into alarm on an SLC in under 3 seconds. The auxiliary 5815XL SLC loop module must be capable of being located up to 6000 feet from the FACP on an RS-485 bus, which is separate from the SLC bus. The SLC shall be capable of functioning in a class A or class B configuration.

C. Over current Protection

All low voltage circuits will be protected by microprocessor-controlled power limiting or have a self-restoring poly switch for the following: smoke detector power, main power supply, indicating appliance circuits, battery standby power and auxiliary output.

D. Notification Appliance Mapping Structure

All notification circuits and modules shall be programmable via a mapping structure that allows for a maximum of 250 output groups. Each of these groups shall have the ability to be triggered by any of the panels 125 Zones. A zone may trigger from groups individually or may contain a global trigger for manual pull stations, fire drills and two different system alarms. Additionally, each Zone will individually control the cadence pattern of each of the Groups that it is "Mapped" to so that sounders can indicate a variety of conditions. The Zone shall be capable of issuing a different cadence pattern for each of the Groups under it's control. The mapping structure must also allow a group to be designated to "ignore cadence" for use with strobes and other continuous input devices. Zones shall have eight different output categories; Detector alarm, Trouble, Supervisory, Pre-alarm, Waterflow, Manual pull, Zone auxiliary one and Zone Auxiliary two. Each of the categories shall have the ability to control from 1 to 8 output groups with a cadence pattern. The patterns are; March code, ANSI 3.41, Single Stroke Bell Temporal, California code, Zone 1 coded, Zone 2 coded, Zone 3 coded, Zone 4 coded, Zone 5 coded, Zone 6 coded, Zone 7 coded, Zone 8 coded, Custom output pattern 1, Custom output pattern 2, Custom output pattern 3, Custom output pattern 4, and Constant. This mapping/cadence pattern shall be supported by all system power supplies and Notification Expander Modules.

2.02 SYSTEM OPERATION

A. Alarm

When a device indicates any alarm condition the control panel must respond within 3 seconds. The General Alarm or Supervisory Alarm LED on the annunciator(s) should light and the LCD should prompt the user as to the number of current events. The alarm information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the alarm device is restored to normal, the control panel shall be required to be manually reset to clear the alarm condition, except that the alarms may be silenced as programmed.

An alarm shall be silenced by a code or Firefighter key at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur (subsequent alarm feature). When alarms are silenced the silenced LED on the control panel, and on any remote annunciators shall remain lit, until the alarmed device is returned to normal.

B. Troubles

When a device indicates a trouble condition, the control panel System Trouble LED should light, and the LCD should prompt the user as to the number of current events. The trouble information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators.

When the device in trouble is restored to normal, the control panel shall be automatically reset, the trouble restore information must be stored in event memory for later review. Event memory must be available at the main and all remote annunciators. A trouble shall be silenced by a code or Firefighter key at the main or remote annunciators. When silenced, this shall not prevent the resounding of subsequent events if another event should occur.

C. Supervision methods

Each SLC loop shall be electrically supervised for opens and ground faults in the circuit wiring and shall be so arranged that a fault condition on any loop will not cause an alarm to sound. Additionally, every addressable device connected to the SLC will be supervised and individually identified if in a fault condition. The occurrence of any fault will light a trouble LED and sound the system trouble sounder but will not interfere with the proper operation of any circuit which does not have a fault condition.

Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder but will not interfere with the proper operation of any circuit which does not have a fault condition.

PART 3 - ACCESSORY COMPONENTS

3.01 Furnish and install, where shown on the drawings, the following devices

A. Notification Devices

The visual and audio/visual signaling devices shall be compatible with the FACP and be Listed with Underwriters Laboratories Inc. per UL 1971 and/or 1638. Each indicating appliance circuit shall be electrically supervised for opens, grounds and short circuit faults, on the circuit wiring, and shall be so arranged that a fault

condition on any indicating appliance circuit or group of circuits will not cause an alarm to sound. The occurrence of any fault will light the trouble LED and sound the system trouble sounder but will not interfere with the proper operation of any circuit which does not have a fault condition. The notification appliance (combination audio/visual units only) shall produce a peak sound output of 90dba or greater as measured in an anechoic chamber. The appliance shall be capable of meeting the candela requirements of the blueprints presented by the Engineer and ADA. The appliance shall be polarized to allow for electrical supervision of the system wiring. The unit shall be provided with terminals with barriers for input/output wiring and be able to mount a single gang or double gang box or double workbox with the use of an adapter plate. The unit shall have an input voltage range of 19-30 volts

PART 4 - WIRING

4.01 Installer's Responsibilities

- A. The installer shall coordinate the installation of the fire alarm equipment.
- B. All conductors and wiring shall be installed according to the manufacturer's recommendations.
- C. It shall be the installer's responsibility to coordinate with the supplier, regarding the correct wiring procedures before installing any conduits or conductors.

4.02 Installation of System Components

- A. System components shall be installed in accordance with the latest revisions of the appropriate NFPA pamphlets, the requirements contained herein, National Electrical Code, local and state regulations, the requirements of the fire department and other applicable authorities having jurisdiction (AHJ).
- B. All wire used on the fire alarm system shall be U.L. Listed as fire alarm protection signaling circuit cable per National Electrical Code, Articles 760.

PART 5 - WARRANTY AND FINAL TEST

5.01 General

- A. Contractor shall provide two (2) years of installation warranty commencing on record date of the Notice of Completion (N.O.C) in addition to the manufacturer's standard product warranty.
- B. All fire alarm work provided under this contract shall be tested in presence of project inspector (I.O.R) and local Fire Authority having Jurisdiction prior to occupancy.
- C. Contractor shall review all work provided under this contract with the designated College Representative prior to expiration of warranty as a condition to end warranty period.

- D. Contractor shall submit all materials and products intended to be used on this project as part of their shop drawing submittals for approval prior to use at site. No exceptions will be made for non –compliance of this requirements.
- E. Contractor shall provide training for the College's Maintenance & Operations staff and informal commissioning of the systems prior to final acceptance by the College. M & O staff designated by the College shall sign off this requirement prior to project closeout. This may involve multiple site visits by contractor to meet these requirements.
- F. Contractor shall provide a review and written report of all equipment performance and submission of finding to the College prior to expiration of product warranty. Any deficiencies noted or found prior to expiration of warranty period shall be corrected or replaced to the satisfaction of the College.
- G. Contractor shall provide a review on site and re-training for M & O department prior to end of the warranty period.

5.02 Final Test

- A. Before the installation shall be considered completed and acceptable by the awarding authority, a test of the system shall be performed as follows:
- B. The contractor's job foreman, a representative of the owner, and the fire department shall operate every building fire alarm device to ensure proper operation and correct annunciation at the control panel.
- C. At least one half of all tests shall be performed on battery standby power.
- D. Where application of heat would destroy any detector, it may be manually activated.
- E. The communication loops and the indicating appliance circuits shall be opened in at least two (2) locations per circuit to check for the presence of correct supervision circuitry.
- F. When the testing has been completed to the satisfaction of both the contractor's job foreman and owner, a notarized letter cosigned by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the fire department.
- G. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within one year (365 days) from the date of final acceptance by the awarding authority.
- H. Prior to final test the fire department must be notified in accordance with local requirements.

5.03 As Built Drawings, Testing, and Maintenance Instructions

- A. As Built Drawings

A complete set of reproducible “as-built” drawings showing installed wiring, color coding, and wire tag notations for exact locations of all installed equipment, specific interconnections between all equipment, and internal wiring of the equipment shall be delivered to the owner upon completion of system.

B. Operating and Instruction Manuals

Operating and instruction manuals shall be submitted prior to testing of the system. Three (3) complete sets of operating and instruction manuals shall be delivered to the owner upon completion. User operating instructions shall be provided prominently displayed on a separate sheet located next to the control unit in accordance with U.L. Standard 864.

5.04 PROTECTION

Protect the Work of this section until Substantial Completion.

5.05 CLEANUP

Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION