

**UNIVERSITY OF IDAHO
RINKER ROCK CREEK RANCH BARN
REMODEL
FAIRFIELD, IDAHO 83327**

UI CP240031

**TECHNICAL SPECIFICATIONS
BID DOCUMENTS**

29 MARCH 2024

ZGA PROJECT NO. 2208.01

The logo for ZGA, consisting of the letters 'ZGA' in a stylized, red, handwritten font.

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PROJECT:

RINKER ROCK CREEK RANCH BARN REMODEL

UNIVERSITY OF IDAHO
Moscow, Idaho 83844
UI PN#CP240031

OWNER:

THE REGENTS, UNIVERSITY OF IDAHO

Moscow, Idaho

DESIGN AGENCY

**Architectural & Engineering Services
Facilities Services**

University of Idaho
875 Perimeter Drive, MS2281
Moscow, Idaho 83844-2281
Phone: 208-885-6246

UI Project Manager: Ethan O'Brien

DESIGN CONSULTANT

ZGA Architects & Planners, Chtd.

300 E. Mallard Drive, Suite 325
Boise, Idaho 83706
Phone: 208-345-8872
Fax:
Email: lance@zga.com

Primary Contact: Lance Fish AIA



DESIGN SUB-CONSULTANTS

Civil Engineer:

HLE, Inc.

800 W. Judicial St.
Blackfoot, Idaho 83221
Phone: 208-785-2977
Email: andrewf@hleinc

Structural Engineer

Ally Structural Consulting

3778 Plantation River
Boise, Idaho 93703
Phone: 208-949-5993
Email: cbrasher@allystructural.com

Mechanical Engineer

Engineering Consultants, Inc.

303 South Federal Way
Boise, Idaho 83705
Phone: 208-376-9820
Email: cathy@eciboise.com

Electrical Engineer

Engineering Consultants, Inc.

303 South Federal Way
Boise, Idaho 83705
Phone: 208-376-9820
Email: bruno@eciboise.com

DATES:

Pre-Bid Conference: Wednesday June 5, 2024, 1:00 p.m. Pacific Standard Time
Bid Opening: Tuesday June 18, 2024 2:00 p.m. Pacific Standard Time
Substantial Completion: (120) Calendar Days from Notice to Proceed (Base Bid)
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PART I – BIDDING REQUIREMENTS

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ADVERTISEMENT FOR BIDS
Rinker Creek Ranch Barn Remodel
University of Idaho
Moscow, Idaho

UI PN: CP240031

OWNER: THE REGENTS UNIVERSITY OF IDAHO May 20, 2024

ISSUED BY: Architectural & Engineering Services
University of Idaho
Moscow, Idaho 83844-2281

PROJECT MANAGER: Ethan O'Brien
Architectural and Engineering Services
University of Idaho
Moscow, Idaho 83844-2281

Sealed bids will be received at Architectural & Engineering Services, University of Idaho through 2:00 p.m. prevailing local time on Tuesday June 18, 2024. Proposals will subsequently be opened and publicly read at:

Architectural & Engineering Services
875 Perimeter Drive, University of Idaho
Moscow, Idaho 83844-2281
(208) 885-6246

Plans, specifications, bid proposal forms and other information are available for examination at regional plan centers. For a list of plan centers holding University of Idaho projects, see <http://www.uidaho.edu/facilities> , or contact Architectural and Engineering Services, at (208) 885-6246.

Plans, specifications and bidding materials may be obtained at:

1. Idaho AGC 208-344-2531 or <https://www.idahoagc.org/plan-room>
2. Blueprint Specialties (Boise) 208-377-0294 <https://www.docuproject.com> for \$20.00 per digital download.

DESCRIPTION OF WORK: The work consists of all labor, materials, equipment and services necessary to provide for:

1. Base Bid: the base bid shall include all demolition and construction work associated with the reconstruction of an existing 1,736 square foot agricultural barn. The barn will have new reinforced concrete footings, foundations and slab floors with new wood structure, metal roofing, cementitious siding, aluminum framed windows, hollow metal doors and frames, overhead doors, and gypsum board interior wall finishes. Minor HVAC will used for night flushing; electrical lighting and outlets will be connected to a lithium battery electrical system charged by solar panels and protected by an potassium aerosol fire suppression system.
2. Add Alternate Number 1: Single chamber vault toilet purchase, transportation and installation and roadside upgrades for accessibility. Spring 2025 purchase and installation, bid accordingly.

BID BOND: A bid bond equal to 5% of the amount bid must accompany the bid proposal. (See instructions to bidders.)

PUBLIC WORKS CONTRACTOR'S LICENSE: Public Works Contractor's License for the State of Idaho is required to bid on this project. (See instructions to bidders and general conditions for further bidder qualifications.)

ESTIMATED COST: \$600,000.00

CONTRACT TIME: One hundred twenty (120) calendar days from Notice to Proceed for Base Bid, Sixty (60) calendar days for Add Alternate Number 1. (Refer also to Instructions to Bidders, Bid Proposal and Agreement.)

PRE-BID CONFERENCE: An online pre-bid conference will be held June 5, 2024 at 1:00 p.m. Pacific Standard Time / 2:00 p.m. Mountain Standard Time with Microsoft Teams Meeting.

Microsoft Teams

Meeting ID: 297 316 846 660

Passcode: oSd2VW

SITE VISIT: The site will be made open and available to visit June 6, 2024 from 9:00 a.m. to 3:00 p.m. Rinker Rock Creek Ranch is directly north of Magic Reservoir along Rock Creek. The turn-off to Rock Creek is 20 miles east of Fairfield, 5 miles west of the intersection of Highway 20/Highway 75. Continue north along Rock Creek unpaved road for 4 miles, the barn sits alone in the valley alongside the road.

Signed by:



Kim Salisbury, Associate VP, Budget & Planning

UNIVERSITY OF IDAHO

Moscow, Idaho

END OF ADVERTISEMENT FOR BIDS

NOTICE

LICENSING OF PUBLIC WORKS CONTRACTORS STATE OF IDAHO

UNLAWFUL

... for any person to engage in the business or act in the capacity of a PUBLIC WORKS CONTRACTOR within this state without first obtaining and having a license issued by the administrator of the Division of Building Safety (54-1902.1)

... for any PUBLIC WORKS CONTRACTOR to subcontract in excess of eighty percent (80%) of the work under any contract to be performed by him as such public works contractor. (54-1902.2)

... for any PUBLIC WORKS CONTRACTOR to accept a bid from any person who at that time does not possess the appropriate license for the project involved. (54-1902.3.a)

... for any PUBLIC WORKS CONTRACTOR to accept bids to sublet any part of any contract for specialty construction from a specialty contractor who at that time does not possess the appropriate license. (54-1902.3.b)

WHO MUST BE LICENSED?

PUBLIC WORKS CONTRACTOR ... any person who, in any capacity, undertakes, or offers to undertake, or purports to have the capacity to undertake any construction, repair or reconstruction of any public work, or submits a proposal to, or enters into a contract with, the State of Idaho, or any county, city, school district, sewer district, fire district, or any other taxing subdivision or district of any public or quasi-public corporation of the state. (54-1901)

PUBLIC WORK includes heavy construction, highway construction, building construction or specialty construction. (54-1901)

PENALTIES

... any person, firm, co-partnership, corporation, limited liability company, limited liability partnership, association or other organization acting in the capacity of a PUBLIC WORKS CONTRACTOR without a license shall be guilty of a MISDEMEANOR. (54-1920.1)

EXEMPTION

Any construction, alteration, improvement or repair involving any single project involving any number of trades or crafts with an estimated cost of less than fifty thousand dollars (\$50,000). (54-1903)

AUTHORITY

Title 54, Chapter 19 Idaho Code: "THE PUBLIC WORKS CONTRACTORS LICENSING ACT"



IDAHO DIVISION OF BUILDING SAFETY
1090 E. Watertower Street, Suite 150
Meridian, ID 83642
208-334-3950

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INSTRUCTIONS TO BIDDERS

AIA Document A701™ – 1997

Instructions to Bidders

By Reference

By reference, the printed document “Instructions to Bidders, AIA Document A701 - 1997” is hereby included and shall be a part of the Contract Documents. Copies of AIA Document A701 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Copies may also be purchased from the American Institute of Architects or its local distributor.

Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF INSTRUCTIONS TO BIDDERS

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SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

NOTICE:

The following supplements modify and are to be used in conjunction with the Instructions to Bidders AIA Document A701 - 1997. These Supplementary Instructions supersede and take precedence over those portions of the Instructions to Bidders which are added to, deleted from, or otherwise modified herein. Unaltered portions of AIA A701 - 1997, shall remain in effect.

ARTICLE 4: BIDDING PROCEDURES

4.2 Bid Security

Add the following Clause 4.2.1.1 to 4.2.1:

4.2.1.1 To be considered, proposals must be accompanied by an acceptable security, in an amount not less than five (5) percent of the total amount of the bid. The security may be in the form of a bond, or a certified or cashier's check.

Add the following Clause 4.2.3.1 to 4.2.3:

4.2.3.1 The bidder's security will be returned promptly after the Owner and the accepted bidder have executed a contract, or, if no award has been made within thirty (30) days after the opening of bids; upon demand of the bidder at any time thereafter, so long as he has not been notified of the acceptance of his bid.

Add the following Subparagraph to 4.2:

4.2.4 A successful bidder who fails to sign the contract for the work or furnish the required bonds within ten (10) days after he has received notice of the acceptance of his bid, shall forfeit his security deposit. The Owner may then award the contract to the next lowest bidder, in which event any excess of the lowest bidder's security over the difference between the lowest and next lowest bids will be returned to the lowest bidder or, if a bidder's bond is used, to the surety. If, upon a forfeiture by the lowest bidder, the Owner does not award the contract to the next lowest bidder, the security will be applied toward the planning and bid invitation costs.

4.3 Submission Of Bids

Add the following Clause 4.3.1.1 and 4.3.1.2 to 4.3.1:

4.3.1.1 The mailing envelope containing the bid shall be addressed as follows:

Sealed Bid
Architectural & Engineering Services
University of Idaho
875 Perimeter Drive MS2281
Moscow, Idaho 83844-2281

4.3.1.2 Along with his bid, the bidder shall submit an affidavit certifying his compliance with Idaho Code, Title 72, Chapter 17, requiring the contractor and his subcontractors at the time of bid to provide a drug-free workplace program and to maintain such program throughout the duration of the contract.

ARTICLE 5: CONSIDERATION OF BIDS

Add the following Paragraphs 5.4 through 5.6 to Article 5:

5.4 Public Works Contractor's License

5.4.1 This Public Works project **is not** financed in whole or in part by Federal Aid Funds. Bid proposals will be accepted from those contractors only (prime contractors, subcontractors, and/or specialty contractors) who, **prior to the bid opening**, hold current licenses as public works contractors in the State of Idaho in accordance with Public Works Contractors' State License Law, Title 54, Chapter 19, Idaho Code, as amended.

5.5 Naming Of Subcontractors

5.5.1 Section 67-2310, Idaho Code, requires general (prime) contractors to include in their bids the name of the subcontractors who shall, in the event the Contractor secures the contract, subcontract the plumbing, heating and air conditioning, and electrical work under the general (prime) contract. Failure to name subcontractors as required by this section shall render any bid submitted by a general (prime) contractor unresponsive and void. Subcontractors named in accordance with the provisions of this section must possess an appropriate license or certificate of competency issued by the State of Idaho covering the contractor work classification in which the subcontractor is named.

This law has been interpreted to mean three separate areas of work: 1) plumbing work, 2) heating and air conditioning work, and 3) electrical work. This law has also been interpreted to mean the entity that will perform the work at the site, regardless of contractual relationship whether a subcontractor, a sub-subcontractor, or the prime contractor submitting the bid.

With regard to possessing an appropriate license or certificate of competency all subcontractors listed by the general (prime) [contractor must have at the time of the bid opening a current license in the appropriate category](#) (class, type and specialty category) as issued by the Public Works Contractors State License Board. In addition, plumbing and electrical subcontractors shall have at the time of the bid opening a valid plumbing contractors license or electrical contractors license, respectively, as issued by the Idaho Department of Labor and Industrial Services.

In determining if the above listed subcontractors are required on the project, the Department of Architectural & Engineering Services will refer to the plans and specifications. If doubt exists, the architect/engineer who prepared the plans and specifications will be requested to make the determination. If plumbing, heating and air conditioning or electrical work is not shown on the plans and specifications, but is discovered by the bidder subsequent to the date of bid opening, then the bidder must request clarification from the architect/engineer. Absent such clarification, work will be considered incidental and naming of a subcontractor will not be required.

5.6 Idaho Domiciled Contractors

5.6.1 Section 67-2348, Idaho Code, requires the University of Idaho to apply a preference in determining which contractor submitted the lowest responsible bid. If the contractor who submitted the lowest dollar bid is domiciled in a state which has preference law which penalizes Idaho domiciled contractors, then the University of Idaho must apply preference. The preference that will be applied is the preference law of the domiciliary state of the contractor who submitted the lowest dollar bid.

Generally speaking, a contractor's domiciliary state is the state in which the contractor's home office is located. If federal funds are involved in the project, then no preference will be used.

ARTICLE 6: POST-BID INFORMATION

6.3 Submittals

Delete Subparagraphs 6.3.3 and 6.3.4 and substitute the following:

6.3.3 Prior to the award of the contract, the Owner will notify the bidder in writing of any objections it has, to any proposed person or entity. If the Owner has reasonable objection to any such proposed person or entity, the bidder

may, at his option 1) withdraw his bid, 2) submit an acceptable substitute person or entity with an adjustment in his bid price or cover the difference in cost occasioned by such substitution, or 3) ask for an administrative hearing to determine the responsibility of any such proposed person or entity.

6.3.4 The bidder shall exercise his option in writing within three (3) days after the Owner delivers Notice of Objection to a proposed person or entity to the bidder. If the bidder fails to exercise his option, then the Owner may disqualify the bidder. If the bidder requests an administrative hearing, then the Owner shall schedule a hearing not less than ten (10) days after the Notice of Objection to a proposed person or entity was served upon the bidder. In the event of either withdrawal or disqualification under this subparagraph, bid security will not be forfeited, notwithstanding the provisions of Paragraph 4.4.1.

ARTICLE 7: PERFORMANCE BOND AND PAYMENT BOND

7.2 Time Of Delivery And Form Of Bonds

Add the following Clause 7.2.2.1 to 7.2.2:

7.2.2.1 Performance Bond and Payment Bond required for this project shall be written by a surety company authorized to do business in Idaho.

END OF SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

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SUBSTITUTION REQUEST FORM
(Submit not less than ten (10) days before bid date)

PROJECT: Rinker Rock Creek Ranch Barn Remodel UI PN#CP240031

TO: ZGA Architects & Planners, Chtd.

We hereby submit for your consideration the following product instead of the specified item for the above project:

Section: _____ Paragraph: _____ Specified Item: _____

PROPOSED SUBSTITUTION:

Attach complete technical data, including laboratory tests, if applicable. Include complete information on changes to Drawings and/or Specifications which proposed substitution will require for its proper installation. Fill in blanks below:

- A. Does the substitution affect dimensions shown on Drawings?

- B. Will the undersigned pay for changes to the building design, including engineering and detailing costs caused by the requested substitution?

- C. What effect does substitution have on other trades?

- D. Differences between proposed substitution and specified item?

- E. Manufacturer's guarantees / warranties of the proposed and specified item?
 Same Different (explain on attachment)

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

Submitted by: _____

Signature _____ Date _____

Firm or Company _____

Address Line 1 _____

Address Line 2 _____

Telephone _____

<p>For Use by Design Consultant:</p> <p><input type="checkbox"/> Accepted</p> <p><input type="checkbox"/> Accepted as Noted</p> <p><input type="checkbox"/> Not Accepted</p> <p><input type="checkbox"/> Received Too Late</p> <p>By: _____</p> <p>Date: _____</p> <p>Remarks: _____</p>

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BID PROPOSAL

PROJECT: **RINKER ROCK CREEK RANCH BARN REMODEL**
UNIVERSITY OF IDAHO
Moscow, Idaho

UI PROJECT NUMBER: CP240031

BID OPENING DATE: Monday, June 17, 2024
BID OPENING TIME: 2:00 P.M. Prevailing Local Time (Pacific Standard Time)

BID OPENING LOCATION: Architectural & Engineering Services
University of Idaho
875 Perimeter Drive, MS 2281
Moscow, ID 83844-2281
(208) 885-6246

BIDDER'S NAME AND ADDRESS:

BIDDER'S CONTACT PERSON:

TO: Director, Architectural & Engineering Services

The Bidder, in compliance with the Advertisement for Bids for the above referenced project, having examined the bidding and Contract Documents and the site of the proposed Work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to furnish all labor, materials and supplies and to provide the service and insurance in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below. These prices are to cover all expenses incurred in performing the Work required under the Contract Documents.

The bidder agrees to commence work on this project on or before a date to be specified in the written Notice to Proceed issued by the Owner and to substantially complete the work within One Hundred Twenty (120) consecutive calendar days for Base Bid, Sixty (60) consecutive calendar days for Add Alternate 1 after receipt of the Notice to Proceed. The bidder agrees to pay as liquidated damages Five Hundred Dollars (\$500) per calendar day after the established substantial completion date or adjusted date as established by change order.

Bidder acknowledges receipt of Addenda No.(s)_____.

(List all Addenda)

BASE PROPOSAL: Bidder agrees to perform all of the base proposal Work described in the specifications and shown on the plans for the sum of

_____ Dollars (\$_____)
(Amount shall be shown in both words and figures. If case of discrepancy, amount shown in words shall govern.)

BID ALTERNATE NO. 1: Vault Toilet

Add the sum of _____ Dollars (\$_____)
(Amount shall be shown in both words and figures. If case of discrepancy, amount shown in words shall govern.)

The bidder understands that the Owner reserves the right to reject any or all bids and to waive any informalities in the bidding.

The bidder agrees that this bid shall remain valid and may not be withdrawn for a period of thirty (30) calendar days after the scheduled closing time for receiving bids.

Upon receipt of written notice of the Owner's Intent to Award the contract, the bidder shall execute, within ten (10) days, the attached formal contract and deliver to the Owner a Performance Bond and Labor and Materials Payment Bond in the amounts of 100% of the bid amount by a surety company authorized to do business in the State of Idaho, a Certificate of Insurance issued by a surety company authorized to do business in the State of Idaho and accompanied by Power of Attorney, a Contractor's Affidavit Concerning Taxes, and the Public Works Contract Report on Subcontractors.

In the event the contract documents stated above are not returned within ten (10) days, the attached Bid Guarantee for five percent (5%) of the bid amount becomes the property of the Owner for use as liquidated damages for the delay and additional expense to the Owner caused thereby.

Enclosed is bid guarantee consisting of: _____ in the amount of five percent (5%) of the bid amount.

IDAHO NAMING LAW

Refer also to Section 5.6 of the "Supplementary Instructions to Bidders."

Pursuant to Section 67-2310, Idaho Code, the Idaho Naming Law requires that the general contractor must list the business name and Public Works license number of certain subcontractors in the Bid Form at the time the bid is submitted. The law stipulates that these will be the major mechanical and electrical subcontractors who the general contractor agrees to engage to do the work. **The firms listed below must be those who will actually do the work on site, regardless of contractual considerations between the general contractor and the subcontractors.** If the scope of work does not include mechanical or electrical components, any firm hired to do incidental piping or wiring such as the installation of a temporary service to a job trailer, need not be listed.

The names and public works licenses of subcontractors to whom work will be awarded, subject to approval of the Owner and Architect, if the undersigned is awarded the contract, are as follows:

Plumbing (PWCL Category 15400)

Does this project involve Plumbing work? Yes _____ No _____

(Name) _____

Idaho Public Works Contractors License No. _____

Heating, Ventilating & Air Conditioning (PWCL Category 15700-HVAC)

Does this project involve Heating, Ventilating & Air Conditioning work? Yes _____ No _____

(Name) _____

Idaho Public Works Contractors License No. _____

Electrical (PWCL Category 16000)

Does this project involve Electrical work? Yes _____ No _____

(Name) _____

Idaho Public Works Contractors License No. _____

IDAPA 18.01.49 requires that the fire sprinkler contractor/subcontractor be licensed as an Idaho Fire Sprinkler Contractor. The Owner requests the name and license numbers of the contractor/subcontractor who will perform the fire sprinkler work, subject to approval of Owner and Architect, if undersigned is awarded the Contract:

Does this project involve Fire Sprinkler work? Yes _____ No _____

(Name) _____

Idaho Public Works Contractors License No. _____

Should the listing of subcontractors change due to selection of alternates or other similar circumstances, attach explanation.

The State of Idaho policy prohibits purchase of asbestos projects and asbestos containing materials for use in or on any facilities, including personal and real property, where acceptable alternatives are available.

The contractor certifies by submission of this bid proposal that the products or materials to be furnished as a result of this bid are asbestos free. Projects for which an adequate substitute is not available shall be identified by a separate written statement. The asbestos content shall be given if known and a certification that no known asbestos substitute exists.

The owner will hold the contractor and/or his supplier(s) liable for any asbestos removal and replacement costs as a result of the contractor's failure to comply with this requirement.

The undersigned notifies that it is of this date duly licensed as an Idaho Public Works Contractor and further that it possesses Idaho Public Works Contractor's License No. _____, and is domiciled in the State of _____.

Dated this _____ day of _____, _____.
(date) (month) (year)

Respectfully submitted by:

(Contractor's Name)

SEAL
(Seal - if bid is by a corporation)

(Street or PO Address)

(City, State and zip code)

(Authorized Signature)

(Title)

(Telephone Number)

(FAX Number)

(Email Address)

Have you remembered to include a bid security (bid bond or a certified or cashier's check), the power of attorney (if using a bid bond) and the Contractor's Affidavit Concerning Alcohol and Drug-Free Workplace with your bid?

END OF BID PROPOSAL

**CONTRACTOR'S AFFIDAVIT
CONCERNING ALCOHOL AND DRUG-FREE WORKPLACE**

STATE OF _____

COUNTY OF _____

Pursuant to the Section 72-1717, Idaho Code, I, the undersigned, being duly sworn, depose and certify that _____ is in compliance with the provisions of Section 72-1717, Idaho Code; that _____ provides a drug-free workplace program that complies with the provisions of Title 72, Chapter 17, Idaho Code, and will maintain such program throughout the life of a state construction contract; and that _____ shall subcontract Work only to subcontractors meeting the requirements of Section 72-1717(1)(a), Idaho Code.

Name of Contractor

Address

City and State

By: _____
(Signature)

Subscribed and sworn to before me this _____ day of _____, _____.

NOTARY PUBLIC

Residing at: _____

Commission expires: _____

**FAILURE TO EXECUTE THIS AFFIDAVIT AND SUBMIT IT ALONG WITH YOUR BID SHALL MAKE
YOUR BID NON-RESPONSIVE.**

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BID BOND

AIA® Document A310™ – 2010

Bid Bond

By Reference

By reference, the printed document “Bid Bond, AIA Document A310 - 2010” shall be used to accompany the Bid as specified hereinbefore. Upon request, the Architect will furnish two (2) copies of bond forms to bidders for their use.

Printed company forms, approved by The American Institute of Architects and so verified, may be used in lieu of AIA Document A310 - 2010.

Refer to Instructions to Bidders for description of Bid Bond requirements.

Attorneys-in-fact who sign Bid Bonds shall be licensed in the State of Idaho and must file with each bond a certified and effectively dated copy of their Power-of-Attorney on the form specified and bound in this specification document if the Bid Bond is executed on AIA Document A310.

Approved printed company forms may be used in lieu of form hereinbefore specified.

Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF BID BOND SECTION

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POWER OF ATTORNEY

Description of Project to be Bid:

(Project Name) _____

(Building) _____

UNIVERSITY OF IDAHO
Moscow, Idaho

Form to Accompany Bid Bond: (AIA Document A310 - 2010)

The undersigned swears that they are duly licensed in the State of Idaho and have full Power of Attorney to act for and to bind and obligate _____
(issuing company)

a corporation registered in the State of _____ and authorized to do business under the laws of the State of Idaho in all matters pertaining to this bid.

The undersigned agrees that, if the contractor for whom _____
(issuing company)

has issued the accompanying bid bond is awarded the contract, _____
(issuing company)

will furnish proper performance and labor and materials bonds if and when bonds are requested by said contractor,

Name: _____

By: _____
(Signature)

Date: _____

(SEAL)

NOTARY PUBLIC

Residing at: _____

Commission expires: _____

Date: _____

END OF POWER OF ATTORNEY

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PART II – CONTRACT REQUIREMENTS

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AGREEMENT BETWEEN OWNER and CONTRACTOR

AIA[®] Document A101[™] – 2017

Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum

By Reference

By reference, the printed document “Standard Form of Agreement Between Owner and Contractor, AIA Document A101 – 2017” is hereby included and shall be a part of the Contract Documents. Copies of AIA Document A101 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Copies may also be purchased from the American Institute of Architects or its local distributor.

Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF AGREEMENT BETWEEN OWNER and CONTRACTOR

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SUPPLEMENTARY CONDITIONS to OWNER and CONTRACTOR AGREEMENT

NOTICE:

The following supplements modify and are to be used in conjunction with the Standard Form of Agreement Between Owner and Contractor, AIA Document A101 - 2017. These Supplementary Conditions supersede and take precedence over those portions of the Standard Form of Agreement Between Owner and Contractor which are added to, deleted from, or otherwise modified herein. Unaltered portions of AIA A701 - 1997, shall remain in effect.

ARTICLE 3, DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

3.1 The date of commencement shall be set forth in a Notice to Proceed issued by the Owner.

ARTICLE 4, CONTRACT SUM

4.5: Liquidated Damages will be included as provided by Section 9.11.1 of the Supplementary Conditions to the contract.

ARTICLE 5, PROGRESS PAYMENTS

5.1.1 Applications for Payment shall be submitted on University of Idaho, Facilities Standard Application for Payment forms. An initial application for payment form will be provided by the Owner to the Contractor at the execution of the Agreement.

5.1.3 Thirty days will be allowed for payments by the Owner.

5.1.7 Retainage

5.1.7.1 Retainage shall be 5% for work completed and material suitably stored.

5.1.7.2 No reduction in the Retainage will be allowed prior to final completion without written approval of the Owner and consent of surety for partial release of Retainage.

Add the following paragraph 5.1.10:

5.1.10: The Contractor shall not be allowed to withhold more Retainage from a subcontractor or supplier than retained from their portion of the work.

ARTICLE 9, ENUMERATION OF CONTRACT DOCUMENTS

At paragraph 9.1.5, after the word "Drawings", delete the subtitles "Section", "Title" and "Date", and insert in their place the following:

"Refer to attached contract Exhibit A titled "Enumeration of Contract Drawings and Specifications".

At paragraph 9.1.6, after the word "Drawings", delete the subtitles "Section", "Title", "Date" and "Pages", and insert in their place the following:

"Refer to attached contract Exhibit A titled "Enumeration of Contract Drawings and Specifications".

END OF SUPPLEMENTARY CONDITIONS TO OWNER and CONTRACTOR AGREEMENT

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GENERAL CONDITIONS of the CONTRACT

 **AIA[®] Document A201[™] – 2017**
General Conditions of the Contract for Construction

By Reference

By reference, the printed document "General Conditions of the Contract for Construction, AIA Document A201 – 2017" is hereby included and shall be a part of the Contract Documents. Copies of AIA Document A201 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Copies may also be purchased from the American Institute of Architects or its local distributor.

Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF GENERAL CONDITIONS of the CONTRACT

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SUPPLEMENTARY CONDITIONS of the CONTRACT FOR CONSTRUCTION

NOTICE:

The following supplements modify and are to be used in conjunction with the General Conditions of the Contract for Construction, AIA Document A201 - 2017. These Supplementary Conditions supersede and take precedence over those portions of the General Conditions for the Contract for Construction which are added to, deleted from, or otherwise modified herein. Unaltered portions of AIA A201 - 2017, shall remain in effect.

ARTICLE 1 GENERAL PROVISIONS

1.1 Basic Definitions

Add the following Clause 1.1.4.1 to Subparagraph 1.1.4:

1.1.4.2 The entire project shall be considered as one "portion" unless separate areas or phases are designated for separate completion times or separate areas of completion and occupancy. This definition is used in determining release of retainage.

1.2 Correlation and Intent Of The Contract Documents

Add the following Clause 1.2.1.2 to Subparagraph 1.2.1:

1.2.1.2 Conflicts in the Construction Documents shall be brought to the attention of the Architect. In such instances, the following is the order of authority of the documents, the first taking highest precedence:

- Agreement between Owner and Contractor
- Addenda
- Supplementary Conditions
- General Conditions
- Technical Specifications
- Written notes, then schedules on the drawings shall be followed in preference to information furnished in the form of lines on drawings
- Drawings

In the case of an inconsistency between drawings and specifications or within either document not clarified by addendum, the better quality or greater quantity of work shall be provided in accordance with the Architect's interpretation.

Add the following Clause 1.2.2.1 to Subparagraph 1.2.2:

1.2.2.1 Such organization shall not operate to make the Architect an arbiter to establish subcontract limits between Contractor and Subcontractor.

Add the following Subparagraphs 1.2.4 through 1.2.6 to Paragraph 1.2:

1.2.4 Conditions of the Contract shall be read by all prime contractors and by each subcontractor or sub-subcontractor and shall be considered a part of each section of the Technical Specifications. Provisions of Contract Documents are binding on the contractors, subcontractor, and sub-subcontractors for all work shown or indicated on the original Contract Documents plus any additional work authorized by change order, interpretation or field orders.

1.2.5 The Contractor shall notify the Architect of any condition he finds where, in his judgment, it will be desirable

to modify the requirements to produce the best results. If the Contractor fails to make such request, he is deemed to have accepted the specified and/or detailed method of installation as being adequate to produce first class, satisfactory work. Should conflict occur in or between drawings and specifications, the Contractor is deemed to have estimated on the more expensive way of doing the work unless he shall have asked for, and obtained, a written decision seven (7) days before submission of proposal as to which method or materials will be required. Manufacturer's equipment specifications are based on models and/or construction and installation methods prevailing at the date of invitation and/or advertisement to submit bid proposals. Equipment installations requiring modifications due to manufacturer's model and/or construction changes and other variations from the items specified shall be furnished and installed at no additional cost to Owner.

1.2.6 Requests by the Contractor for written interpretations and/ or detail drawings shall be made to the Architect in a timely manner such as will allow ample time for their preparation and delivery without causing delays in the work. Failure of the Contractor to request needed clarifications and/or his proceeding with affected work prior to receiving same, shall indicate his acceptance of any and all costs and/or delays required on account of necessary corrections.

ARTICLE 2 OWNER

2.1 General

Add the following Clause 2.1.1.1 to Subparagraph 2.1.1:

2.1.1.1 As used herein, Owner means The Regents of the University of Idaho, a public corporation, state educational institution, and a body politic and corporate and existing under the constitution and laws of the state of Idaho, whose address is Vice President for Finance and Administration, University of Idaho, Moscow, ID 83844-3168, who shall act on behalf of the Owner for legal and financial matters; The Assistant Vice President, Facilities, or his designated representative, University of Idaho, Moscow, Idaho, 83844-2281, who shall act on behalf of the Owner on construction administration matters.

2.3 Information And Services Required Of The Owner.

Delete Subparagraph 2.3.4 and substitute the following:

2.2.4 The Owner may furnish to the Architect for inclusion with the Contract Documents surveys describing physical characteristics and utility locations for the site of the project.

Delete Subparagraph 2.3.6 and substitute the following:

2.3.6 The Contractor will be furnished free of charge five (5) copies of Drawings and Project Manuals. Additional sets will be furnished at the cost of reproduction, postage and handling.

Add the following Subparagraph 2.3.7 to Paragraph 2.3:

2.3.7 An Owners Project Representative may be assigned to the project by the Owner. The Project Representative's duties, responsibilities and limitations of authority are set forth in accordance with agency guidelines.

ARTICLE 3 CONTRACTOR

3.3 Supervision and Construction Procedures

Add the following Subparagraph 3.3.4 to 3.3:

3.3.4 All grades, levels, bench marks, locations and corners shall be correctly established by the Contractor.

3.4 Labor and Materials

Add the following Clauses 3.4.2.1 and 3.4.2.2 to Subparagraph 3.4.2:

3.4.2.1 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the following conditions as set forth in the General Requirements (Division 1 of the Specifications).

- .1 Required product cannot be supplied in time for compliance with Contract time requirements.
- .2 Required product is not acceptable to governing authority, or determined to be non-compatible, or cannot be properly coordinated, warranted or insured, or has other recognized disability as certified by Contractor.
- .3 Substantial advantage is offered Owner after deducting offsetting disadvantages including delays, additional compensation to Architect/Engineer for redesign, investigation, evaluation and other necessary services, and similar considerations.

3.4.2.2 By making requests for substitutions based on Subparagraph 3.4.3 above, the Contractor:

- .1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 certifies that the cost data presented is complete and includes all related costs under this contract, except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
- .4 will coordinate the installation of the accepted substitute, making such changes as may be required for the work to be complete in all respects.

3.6 Taxes

Number existing paragraph 3.6.1.

Add the following Subparagraphs 3.6.2 through 3.6.4 to Paragraph 3.6:

3.6.2 The Contractor in consideration of securing the business of erecting or constructing public works in this state, recognizing that the business in which he is engaged is of a transitory character, and that in the pursuit thereof, his property used therein may be without the State when taxes, excises or license fees to which he is liable become payable, agrees:

- .1 To pay promptly when due all taxes (other than on real property), excises and license fees due to the State, its subdivisions, and municipal and quasi-municipal corporations therein, accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term;
- .2 That if said taxes, excises, and license fees are not payable at the end of said term, but liability for the payment thereof exists even though the same constitute liens upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof; and
- .3 That, in the event of his default in the payment of securing of such taxes, excises, and license fees, to consent that the department, officer, board, or taxing unit entering into this contract may withhold from any payment due him hereunder the estimated amount of such accrued and accruing taxes,

excises, and license fees for the benefit of all taxing units to which said contractor is liable.

3.6.3 Before entering into a contract, the Contractor shall be authorized to do business in the State and shall submit a properly executed Contractor's Affidavit concerning Taxes.

3.6.4 Within seven (7) days of receipt of forms from Owner, Contractor shall complete and return to Owner, forms as required by tax collector, showing dates, names, addresses, contracting parties, including all subcontractors, and all other relevant information which may be required.

3.7 Permits, Fees, Notices and Compliance with Laws

Add the following Clauses 3.7.1.1 and 3.7.1.2 to Subparagraph 3.7.1:

3.7.1.1 The Owner shall obtain and pay for plan check fees required by the State of Idaho Division of Building Safety. The Contractor shall pay for plumbing and electrical permits required by the Idaho Division of Building Safety or local authority.

3.7.1.2 The Contractor shall obtain and pay for all licenses and permits, including the main building permit as required by the State of Idaho Division of Building Safety, and shall pay all fees and charges for connections to outside services and for the use of municipal or private property for storage of materials, parking, utility services, temporary obstructions, enclosures, opening and patching of streets, etc., off of the property of the State of Idaho arising from the construction and completion of the work. The contractor shall furnish to the Owner and the Architect no later than the preconstruction conference the permit numbers for electrical, plumbing, and any other required permits that must be obtained through the State of Idaho for the project. The Contractor is not responsible for and will not be required to pay impact fees, sewer capacity fees and similar forms of taxes imposed by local taxing bodies.

3.11 Documents and Samples at the Site

Number existing paragraph 3.11.1.

Add the following Clauses 3.11.1.1 and 3.11.1.2 to Subparagraph 3.11.1:

3.11.1.1 Record drawings shall be kept clean, and notations shall be made using clear, concise drafting techniques acceptable to the Architect.

3.11.1.2 The Contractor shall also maintain at the site for availability of the Owner and/or Architect, one copy of all inspection reports and other written communications from the Architect and/or subcontractors, other prime contractors, materials suppliers, etc.

3.18 Indemnification

Delete Subparagraph 3.18.1 and substitute the following:

3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them, from and against claims, damages, losses and expenses, including, but not limited to, attorney's fees arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) including loss of use resulting therefrom, but only to the extent caused, in whole or in part by negligent acts or omissions of the Contractor, or Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in Paragraph 3.18.

ARTICLE 4 ARCHITECT

4.1 General

After Subparagraph 4.1.1, add the following:

4.1.1.1 Throughout the contract documents where the term Architect is used, it shall be interpreted to mean the ZGA Architects & Planners, Chtd. as identified on the cover of the project manual.

ARTICLE 5 SUBCONTRACTORS

5.2 Award of Subcontracts and Other Contracts for Portions of the Work

Add the following Clause 5.2.1.1 to Subparagraph 5.2.1:

5.2.1.1 Not later than 7 days after the date of commencement, the Contractor shall furnish in writing to the Owner through the Architect the names of persons or entities proposed as manufacturers for each of the products identified in the General Requirements (Division 1 of the Specifications) and, where applicable, the name of the installing subcontractor.

ARTICLE 7 CHANGES IN THE WORK

7.2 Change Orders

Add the following subparagraphs 7.2.2, 7.2.3 and 7.2.4:

7.2.2 The amount allowed for overhead and profit on any change order is limited to the amounts indicated in subparagraph 7.3.11 of these Supplementary Conditions.

7.2.3 Any Change Order prepared, including but not limited to those arising by reason of the parties' mutual agreement or by mediation, shall constitute a final and full settlement of all matters relating to or affected by the change in the work, including, but not limited to, all direct, indirect and consequential costs associated with such change and any and all adjustments to the Contract Sum and Contract Time. In the event a Change Order increases the Contract Sum, the Contractor shall include the work covered by such Change Order in the Application for Payment as if such work were originally part of the Project and Contract Documents.

7.2.4 By the execution of a Change Order, the Contractor agrees and acknowledges that he has had sufficient time and opportunity to examine the change in work which is the subject of the Change Order and that he has undertaken all reasonable efforts to discover and disclose any concealed or unknown conditions which may to any extent affect the Contractor's ability to perform in accordance with the Change Order. Aside from those matters specifically set forth in the Change Order, the Owner shall not be obligated to make any adjustments to either the Contract Sum or Contract Time by reason of any conditions affecting the change in work addressed by the Change Order, which could have reasonably been discovered or disclosed by the Contractor's examination.

7.3 Construction Change Directives

After subparagraph 7.3.1 add the following:

7.3.1.1 A Construction Change Directive, within limitations, may also be used to incorporate minor changes in the work agreed to by the Architect's representative, the University of Idaho Project Manager, and the Contractor's Superintendent. The limits of these representatives' authority with regard to Construction Change Directives shall be documented in writing by the Architect, Owner and Contractor.

In Subparagraph 7.3.4, in the first sentence, delete the words “a reasonable amount” and substitute the words “an allowance for overhead and profit in accordance with subparagraph 7.3.11 of these Supplementary Conditions.” In the second sentence after the words “In such case,” add the words “of an increase in Contract Sum”.

In Subparagraph 7.3.6 after the word "Architect" insert the following words: "in writing within forty-eight hours ".... The balance of the subparagraph remains unchanged.

In Subparagraph 7.3.7, in the last sentence, delete “recorded as a” and substitute “incorporated into a future”.

Delete Subparagraph 7.3.9.

Add the following subparagraphs to Paragraph 7.3:

7.3.11 For purposes of Clause 7.2.2 and Subparagraph 7.3.4 of these Supplementary Conditions, the allowance for combined overhead and profit shall be limited as follows, unless otherwise provided in the Contract Documents:

.1 for total changes of \$10,000 or less in direct cost, the amount allowed for overhead, profit, bonds and insurance for the Contractor and all subcontractors of any tier, combined shall not exceed twenty percent (20%) of direct costs.

.2 for total changes exceeding \$10,000 in direct cost, the amount allowed for overhead, profit, bonds and insurance for the Contractor and all subcontractors of any tier, combined shall not exceed fifteen percent (15%) of direct costs.

.3 the Contractor will determine the apportionment between the Contractor and its subcontractors of allowable amounts of overhead, profit, bonds and insurance.

7.3.12 Each request for a Change Order for extra compensation under this paragraph shall be completed and delivered to the Owner and Architect within thirty (30) calendar days after such change or additional work is completed. To the extent the cost of impacts, delay or hindrance to unchanged work are known at the time of performing the Work, such Change Order shall fully compensate the Contractor. Any request or claim for impact costs, delay, or hindrance must be made within five (5) calendar days of the event from which the claim arises and will be processed in accordance with Article 4.3.

7.3.13 The Contractor shall include equivalent provisions to Subparagraph 7.3.4 in each subcontract and purchase order the Contractor may issue with respect to the Work, and in such instance the cost of the Work to the extent such changed or additional Work has been subcontracted or is being furnished or performed by supplier of materials shall include such monies as may be due the subcontractor or supplier based upon the cost of the Work to such subcontractor or supplier, determined in accordance with the provisions of this Article.

ARTICLE 8 TIME

8.1 Definitions

8.1.2 In the first sentence, delete the word "Agreement" and substitute "Notice to Proceed".

8.2 Progress and Completion

8.2.3 Add the following sentence to Subparagraph 8.2.3:

"The Contractor shall substantially complete the work as defined by subparagraph 9.8.1 within One Hundred Twenty (120) consecutive calendar days for Base Bid, Sixty (60) consecutive calendar days for Add Alternate 1 after the Notice to Proceed as defined by Subparagraph 8.1.2."

8.3 Delays and Extensions of Time

In Subparagraph 8.3.1 delete the words "and binding dispute resolution".

Add the following Subparagraph 8.3.4 to Paragraph 8.3:

8.3.4 If the Contractor submits a progress report or schedule indicating, or otherwise expressing an intention to achieve completion of the Work prior to any completion date required by the Contract Documents or expiration of the Contract Time, no liability of the Owner to the Contractor for any failure of the Contractor to so complete the Work shall be created or implied.

ARTICLE 9 PAYMENTS AND COMPLETION

9.3 Applications for Payment

9.3.1 In the first sentence, delete "At least ten days" and substitute "On or before the date of the monthly construction progress meeting, but not less than thirty (30) days".

Delete Clause 9.3.1.1.

Add the following Clauses 9.3.1.3, 9.3.1.4, and 9.3.1.5 to Subparagraph 9.3.1:

9.3.1.3 "The form of Application for Payment shall be provided by University of Idaho, Architectural & Engineering Services. "

9.3.1.4 Until conditions set forth in Paragraph 9.10 are met, the Owner will pay ninety-five (95) percent of the amount due the Contractor on account of progress payments.

9.3.1.5 The Contractor shall not withhold from a Subcontractor or supplier more than the percentage withheld from a payment certificate for his portion of the Work.

9.3.2 Add the following sentence to Subparagraph 9.3.2:

"Off site storage will not be approved at locations more than 10 miles from the project site, or outside the State of Idaho. Any materials stored off site and paid for by the Owner shall be physically marked as being the property of the State of Idaho, University of Idaho."

9.6 PROGRESS PAYMENTS

Add the following Clauses 9.6.1.1 and 9.6.1.2 to Subparagraph 9.6.1

9.6.1.1 Until conditions set forth in paragraph 9.10 are met, the Owner shall pay ninety-five percent (95%) of the amount due the Contractor on account of progress payments. If the Architect determines that the Contractor has made or is making satisfactory progress on any uncompleted portions of the work, the Owner may, at its discretion, release a portion of the retainage to the Contractor prior to the actual final completion of the conditions set forth in Paragraph 9.10.

9.6.1.2 Progress Payments shall fall due thirty (30) days after the Architect's Certificate for Payment is received by the Owner.

9.7 Failure of Payment

In the first sentence, delete the words "binding dispute resolution" and substitute the word "litigation".

9.8 Substantial Completion

9.8.5 In Subparagraph 9.8.5, delete the last two sentences and add the following:

Upon such acceptance and consent of surety, if any, the Owner shall make payment sufficient to increase the total

payment to ninety-five (95) percent of the Contract sum less such amounts as the Architect shall determine for all incomplete work and unsettled claims.

9.10 Final Completion and Final Payment

In Subparagraph 9.10.1, delete the words "... and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable." from the end of the second sentence.

Add the following Clause 9.10.1.1 to Subparagraph 9.10.1:

9.10.1.1 The final retainage shall become due and payable to the Contractor in not more than thirty (30) days after issuance of the final Certificate for Payment by the Architect, provided that the conditions of subparagraph 9.10.2 are fully satisfied.

Add to Subparagraph 9.10.2 the following:

The following forms shall be used as noted for requirements of subparagraph 9.10.2 and must be submitted prior to or along with the submittal of the Contractor's final request for payment, including release of any retainage.

- .1** For subparagraph 9.10.2 (2), submit a completed Contractor's Affidavit of Debts and Claims (AIA form G706, 1994 ed.).
- .2** For subparagraph 9.10.2 (4), submit a completed Consent of Surety to Final Payment (AIA form G707, 1994 ed.).
- .3** For subparagraph 9.10.2 (6), submit a completed Release of Liens (AIA form G706A 1994 ed.).

Add the following Paragraph 9.11 and Subparagraph 9.11.1 to Article 9:

9.11 Liquidated Damages

9.11.1 The Owner will suffer financial loss in an amount that is difficult to quantify if the Project is not Substantially Complete on the date set forth in the Contract Documents. The Contractor (and his Surety) shall be liable for and shall pay to the Owner the sums hereinafter stipulated as fixed, agreed and liquidated damages, and not as a penalty, for each calendar day of delay until the Work is substantially completed:

FIVE HUNDRED DOLLARS (\$500.00)

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

10.1 Safety Precautions and Programs

Add the following Subparagraph 10.1.2 to Paragraph 10.1:

10.1.2 The Contractor shall maintain, in compliance with Idaho Code, Title 72, Chapter 17, a drug-free workplace program throughout the duration of this contract and shall only subcontract work to subcontractors who have programs that comply with Idaho Code, Title 72, Chapter 17.

10.2 Safety of Persons and Property

Add the following Clause 10.2.4.1 to Subparagraph 10.2.4:

10.2.4.1 When use or storage of explosives or other hazardous material or equipment or unusual method is necessary, the Contractor shall give the Owner reasonable advance written notice.

10.3 Hazardous Materials

Delete Subparagraph 10.3.1 and substitute the following:

10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. In the event the Contractor encounters on the site, material reasonably believed to be hazardous material in any form, including, but not limited to asbestos, polychlorinated biphenyl (PCB), or other toxic substances which have not been rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Architect in writing. If in fact the material is asbestos, polychlorinated biphenyl (PCB), or other toxic substances, the work in the affected area shall not be resumed until all the asbestos, polychlorinated biphenyl (PCB), or other toxic substances have been removed or when it has been rendered harmless by written agreement of the Owner and Contractor, and in accordance with final determination by the Architect.

Add the following Clause 10.3.1.1 to Subparagraph 10.3.1:

10.3.1.1 Reference to asbestos or polychlorinated biphenyl (PCB) in this Article does not negate the appropriate abatement of asbestos and PCB containing materials as specifically required by the Contract Documents.

In Subparagraph 10.3.2 in the first sentence after the word “notice”, insert the following:

“...if the hazardous materials or substances were not reasonably susceptible of being disclosed as indicated in Supplementary Condition subparagraph 4.3.4 or required to be abated by the Contract Documents,”

In Subparagraph 10.3.2 after the first sentence, delete the rest of the subparagraph.

Delete Subparagraph 10.3.3.

In paragraph 10.3.4 in first sentence, after the word “site”, delete the rest of the sentence.

Delete Subparagraph 10.3.6.

10.4 Emergencies

In Subparagraph 10.4 delete the last sentence.

ARTICLE 11 INSURANCE AND BONDS

Delete Article 11 “Insurance and Bonds” in its entirety, and replace with the following revised Article 11 “Insurance and Bonds”.

11.1 Contractor's Liability Insurance

11.1.1 The Contractor shall purchase from and maintain, during the life of the contract and for no less than one year thereafter, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the contractor from claims set forth below which may arise out of or result from the Contractor’s operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- (a) Claims under workers’ compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;

- (b) Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees or persons or entities excluded by the statute from the requirements of Clause 11.1.1.1 but required by the Contract Documents to provide the insurance required by that Clause;
- (c) Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- (d) Claims for damages insured by usual personal injury liability coverage;
- (e) Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- (f) Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- (g) Claims for bodily injury or property damage arising out of completed operations; and
- (h) Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

11.1.1.1 The Contractor shall name the State of Idaho, the University of Idaho, the Architect, their consultants, and their officers, agents, and employees as additional insureds on the insurance policies, except on the workers' or workmen's compensation policy.

11.1.1.2 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:

1. Premises Operations (including X, C, and U coverages as applicable).
2. Independent Contractor's Protective.
3. Products and Completed Operations.
4. Personal Injury Liability with Employment Exclusion deleted.
5. Contractual, including specified provision for Contractor's obligation under Paragraph 3.18.
6. Owned, non-owned, and hired motor vehicles.
7. Broad Form Property Damage including Completed Operations.

11.1.1.3 If the General Liability coverages are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than two (2) years after the date of final payment, certified in accordance with Subparagraph 9.10.2.

11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits:

- .1 Worker's Compensation:
 - a) State: Statutory
 - b) Employer's Liability: \$100,000 per Accident
\$500,000 Disease, Policy Limit

\$100,000 Disease, Each Employee

- .2** Comprehensive or commercial general liability including premises operation; Owners and Contractors protective liability, products and liability (including employee acts), broad form property damage liability, completed operations liability, personal injury liability, and blanket contractual liability;
 - (a) For any claim for bodily injury, property damage or due to contractual liability, limits of not less than \$1,000,000 per occurrence.
 - (b) For products and completed operations coverage, coverage is to be maintained for a period of two (2) years following final payment.
 - (c) For the hazards of explosion, collapse, and underground, commonly referred to as XCU, coverage shall be required if the exposures exist. This coverage may be provided by the subcontractor if the State and prime Contractor are named as additional insureds.
 - (d) For personal injury liability, limits of not less than \$100,000 per occurrence.
- .3** Business auto liability (including owned, non-owned, and hired vehicles) in an amount of not less than \$1,000,000 combined single limit.
- .4** If the General Liability coverages are provided by a Commercial Liability policy, the:
 - (a) General Aggregate shall be not less than \$2 million.
 - (b) Fire legal liability shall be provided in an amount not less than \$50,000 per occurrence.
- .5** Umbrella Excess Liability: An umbrella policy shall be used in combination with other policies to provide a minimum coverage of \$1,000,000.

11.1.2.2 The Owner (the University of Idaho and the State of Idaho) shall be named as an additional insured on the insurance required in Clause 11.1.2.1 Items 2, 3 and 5 above and the insurance shall contain the severability of interest Clause as follows:

"The insurance afforded herein applies separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the company's "liability"."

11.1.2.3 The Contractor shall require all Subcontractors of any tier to provide comprehensive General Liability Insurance with combined single limits for bodily injury and property damage of at least \$1,000,000 per occurrence, and Comprehensive Automobile Liability Insurance for all owned, non-owned, and hired vehicles with combined single limits for bodily injury and property damage of at least \$1,000,000 per occurrence.

11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness. If this insurance is written on the Comprehensive General Liability policy form, the Certificates shall be AIA Document G705, Certificate of Insurance or ACORD Form 25. If this insurance is written on a Commercial General Liability policy form, ACCORD Form 25S will be acceptable.

11.1.3.1 The Owner shall issue to the Contractor a request for certificates of insurance with the agreement. Refer to sample "Request for Certificate of Insurance" form included in the "Contract Requirements" section of the Project Manual wherein these supplemental conditions are located.

11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

11.2 Owner's Liability Insurance

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

11.3 Property Insurance

11.3.1 The Owner shall purchase and maintain throughout the duration of the Project, at Owner's expense, property insurance in the amount of the contract sum and all modifications which change the contract sum and with the coverages as Owner shall, in Owner's discretion, determine. This insurance shall include the interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work. If the Contractor, Architect, Subcontractors or Sub-subcontractors desire additional or different property insurance coverages, then the Contractor, Architect, Subcontractors or Sub-subcontractors shall first contact the Owner to determine if the Owner desires to add the additional or different property insurance coverages at the Owner's expense, and then, if the Owner declines to add the additional or different property insurance coverages, purchase and maintain their own property insurance coverages at their own expense, and the cost of the additional or different insurance coverages shall not be included in the Cost of the Work. To the extent that the property insurance obtained by the Owner covers the Contractor, Architect, Subcontractors or Sub-subcontractors, then the Contractor, Architect, Subcontractor or Sub-subcontractor shall pay from their own funds any cost not covered because of any deductibles. The cost not covered because of any deductibles shall be included in the Cost of the Work and paid by the Owner only if the Contractor, Architect, Subcontractor or Sub-subcontractor was not responsible or at fault in causing the loss that resulted in the cost.

11.3.1.1 The Contractor shall provide insurance coverage for portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also for portions of the Work in transit and all materials stored at the site and incorporated into the Work until covered by the State's insurance program as described in paragraph 11.3.

11.3.1.2 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.3.2 Boiler and Machinery Insurance

11.3.2 The Contractor shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

11.3.3 Loss of Use Insurance

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

11.3.4 Waivers of Subrogation

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages to the work caused by fire or other causes of loss to the extent covered by property insurance obtained

pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

11.4 Performance Bond and Payment Bond

11.4.1 The Contractor shall furnish bonds covering faithful performance of the contract and payment of obligations arising thereunder. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the contract sum. The amount of each bond shall be equal to 100 percent (100%) of the contract sum.

11.4.1.1 The Contractor shall deliver the required bonds to the Owner not later than three days following the date the Agreement is entered into, or if the work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the work, submit evidence satisfactory to the Owner that such bonds will be furnished.

11.4.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

11.4.3 Bonds shall be issued by a bonding company licensed to transact business in the State of Idaho on the standard form of the American Institute of Architects, A.I.A. Doc. A312 Performance Bond and Labor and Material Payment Bond, current edition.

11.4.4 If at any time the Owner for justifiable cause, shall be or become dissatisfied with any surety or sureties that insure the Performance and Payment Bonds, the Contractor shall within ten (10) days after notice from the Owner to do so, substitute an acceptable bond (or bonds) in such form and sum (not to exceed the Contract amount) and signed by such other surety or sureties as may be satisfactory to the Owner. The premiums on such bond(s) shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished such an acceptable bond to the Owner.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

12.2 Correction of Work

12.2.2 After Substantial Completion

In Clause 12.2.2.1 delete the second sentence.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 Governing Law

Add the following Subparagraphs 13.1.2 and 13.1.3 to Paragraph 13.1:

13.1.2 Each Contractor and his Subcontractors and Sub-subcontractors shall certify complete compliance with all Idaho Statutes with specific reference to Public Works Contractor's State License Law, Title 54, Chapter 19,

Idaho Code, as amended.

13.1.3 Pursuant to Sections 44-1001 and 44-1002, Idaho Code, it is provided that each Contractor must employ ninety-five percent (95%) bona fide Idaho residents as employees, except where under such contracts fifty or less persons are employed, the Contractor may employ ten percent (10%) non-residents, provided, however, in all cases employers must give preference to the employment of bona fide residents in the performance of said work, and no contract shall be let to any person, firm, association or corporation refusing to execute an agreement with the above-mentioned provisions in it. In contracts involving the expenditure of Federal Aid Funds, this act shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorably discharged soldiers, sailors, or marines, prohibiting as unlawful any other preference or discrimination among citizens of the United States.

13.2 Successors and Assigns

In Subparagraph 13.2.1, in the second sentence, delete "Except as provided in Section 13.2.2,".

Delete Subparagraph 13.2.2.

13.5 Interest

Delete Paragraph 13.5 and substitute the following:

13.5 Payments due and unpaid under the Contract Documents (30 days from date received by the Architect) shall bear no interest until 30 days past due; thereafter, they shall bear interest at the rate of 5% per annum calculated from 30 days past due (60 days from date received by the Architect) until date of the check as posted by the State Auditor.

Add the following Paragraph 13.6:

13.6 Equal Opportunity

13.8.1 The Contractor shall maintain policies of employment as follows:

13.8.1.1 The Contractor and the Contractor's Subcontractors shall not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin. The Contractor shall take affirmative action to insure that applicants are employed, and that employees are treated during employment without regard to their race, religion, color, sex or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the policies of nondiscrimination.

13.8.1.2 The Contractor and the Contractor's Subcontractors shall, in all solicitations or advertisements for employees placed by them or on their behalf, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex or national origin.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

14.1 Termination by the Contractor

In Subparagraph 14.1.1, in the first sentence, delete the number "30" and substitute the number "60".

Delete Clauses 14.1.1.3 and 14.1.1.4.

Delete Subparagraph 14.1.2.

In Subparagraph 14.1.3 delete “or 14.1.2”.

Delete Subparagraph 14.1.4.

14.2 Termination by the Owner for Cause

In Clause 14.2.2.3 delete the last sentence.

14.4 Termination by the Owner for Convenience

Delete Subparagraph 14.4.3 and substitute the following:

14.4.3 In the case of such termination for the Owner convenience, the Contractor shall be entitled to receive payment from the Owner on the same basis provided in Subparagraph 14.1.3, as modified.

END OF SUPPLEMENTARY CONDITIONS of the CONTRACT for CONSTRUCTION

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WH-5 Public Works Contract Report

Idaho Code sections 54-1904A and 63-3624(g) require all public works contracts to be reported to the Tax Commission. This form must be filed with the Tax Commission within 30 days after a contract is awarded.

Contract awarded by (public body and address)

Contract awarded to (contractor's name and address)

State of incorporation	Federal Employer Identification Number (EIN)	Date qualified to do business in Idaho
Business operates as <input type="checkbox"/> Sole proprietorship <input type="checkbox"/> Partnership <input type="checkbox"/> Corporation <input type="checkbox"/> LLC		Public Works contractor license number
Sole proprietor's Social Security number	Idaho sales/use tax permit number	Idaho withholding tax permit number
Awarding agency project number		Amount of contract \$
Description and location of work to be performed		

PROJECT DATES

Scheduled project start date: _____ Completion date: _____

If the following information is not available at this time, please indicate date it will be: _____

ALL SUBCONTRACTORS

Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Corporation <input type="checkbox"/> Sole proprietorship <input type="checkbox"/> Partnership	Amount of subcontract \$	
Description of work			
Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Corporation <input type="checkbox"/> Sole proprietorship <input type="checkbox"/> Partnership	Amount of subcontract \$	
Description of work			
Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Corporation <input type="checkbox"/> Sole proprietorship <input type="checkbox"/> Partnership	Amount of subcontract \$	
Description of work			
Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Corporation <input type="checkbox"/> Sole proprietorship <input type="checkbox"/> Partnership	Amount of subcontract \$	
Description of work			

ALL SUBCONTRACTORS (CONTINUED)

Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Sole proprietorship	<input type="checkbox"/> Corporation <input type="checkbox"/> Partnership	Amount of subcontract \$
Description of work			

Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Sole proprietorship	<input type="checkbox"/> Corporation <input type="checkbox"/> Partnership	Amount of subcontract \$
Description of work			

Name		Federal EIN	
Address		Public works contractor number	
City, State, ZIP	<input type="checkbox"/> LLC <input type="checkbox"/> Sole proprietorship	<input type="checkbox"/> Corporation <input type="checkbox"/> Partnership	Amount of subcontract \$
Description of work			

SUPPLIERS

Use the space below to report major suppliers of materials and supplies; items removed from inventory; equipment purchased, rented, or leased for use in project; materials provided by government agency. Please indicate how sales or use tax was paid.

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP	Phone	<input type="checkbox"/> Tax paid to supplier	<input type="checkbox"/> Tax paid to state* <input type="checkbox"/> No tax paid

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP	Phone	<input type="checkbox"/> Tax paid to supplier	<input type="checkbox"/> Tax paid to state* <input type="checkbox"/> No tax paid

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP	Phone	<input type="checkbox"/> Tax paid to supplier	<input type="checkbox"/> Tax paid to state* <input type="checkbox"/> No tax paid

Name		Federal EIN	Total value \$
Address		Materials and equipment purchased and used	
City, State, ZIP	Phone	<input type="checkbox"/> Tax paid to supplier	<input type="checkbox"/> Tax paid to state* <input type="checkbox"/> No tax paid

* If tax was not paid to suppliers but **was** or **will be** reported as "items subject to use tax" under your permit number, indicate period of return on which payment **was** or **will be** reported: _____
 If tax was paid to a state **other** than Idaho, name state next to "total value" box(es) above. If tax is due and has **not previously been reported**, attach payment to this form. **If you need more room, please photocopy this page.**

SIGN _____ HERE _____	Authorized signature	Print name	Phone number	Date
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File with the Idaho State Tax Commission, PO Box 36, Boise ID 83722-2210.

For more information, call (208) 334-7618 • Fax: (208) 332-6619 • E-mail: Contractdesk@tax.idaho.gov.

CONTRACTOR'S AFFIDAVIT CONCERNING TAXES

STATE OF _____)

COUNTY OF _____)

Pursuant to the Title 63, Chapter 15, Idaho Code I, the undersigned, being duly sworn, depose and certify that all taxes, excises and license fees due to the State or its taxing units, for which I or my property is liable then due or delinquent, has been paid, or arrangements have been made, before entering into a Contract for construction of any public works in the State of Idaho.

SEAL

Name of Contractor

Address

City and State

By:

(Signature)

Subscribed and sworn to before me this _____ day of _____, _____.

NOTARY PUBLIC

Residing at: _____

Commission expires: _____

END OF CONTRACTOR'S AFFADAVIT CONCERNING TAXES

UNIVERSITY OF IDAHO
REQUEST for CERTIFICATE of INSURANCE
Page 1 of 2

Give this form to your insurance agent / broker

The organization or individual (“Insured”) seeking to negotiate an Agreement or use facilities with the University of Idaho (“Certificate Holder”) is required to carry the types and limits of insurance shown in this Request, and to provide Certificate Holder with a Certificate of Insurance.

- Certificate Holder shall read:

State of Idaho and the Regents of the University of Idaho
Attn: Risk Management
875 Perimeter Drive, MS 2433
Moscow, ID 83844-2433

- Description area of certificate shall refer to the appropriate Agreement, or Facility Use Agreement, or operations of the Insured.
- All certificates shall provide for thirty (30) days’ written notice to Certificate Holder prior to cancellation or material change of any insurance referred to in the certificate.
- All insurers shall have a Best’s rating of A- or better and be licensed and admitted in Idaho.
- All policies required shall be written as primary policies and not contributing to nor in excess of any coverage Certificate Holder may choose to maintain.
- All policies (except Workers Compensation and Professional Liability) shall name the following as Additional Insured: The Regents of the University of Idaho, a public corporation, state educational institution, and a body politic and corporate organized and existing under the Constitution and laws of the state of Idaho.

If Insured is responsible for subcontractors, ISO form CG 2038 0413 shall be used.

- Failure of Certificate Holder to demand a certificate or other evidence of full compliance with these insurance requirements or failure of Certificate Holder to identify a deficiency from evidence that is provided shall not be construed as a waiver of Insured’s obligation to maintain such insurance.
- Failure to maintain the required insurance may result in termination of this grant or contract at the Certificate Holder’s option.
- By requiring this insurance, Certificate Holder does not represent that coverage and limits will necessarily be adequate to protect Insured, and such coverage and limits shall not be deemed as a limitation on Insured’s liability under the terms of the grant or contract.

UNIVERSITY OF IDAHO
REQUEST for CERTIFICATE of INSURANCE
Page 2 of 2

Required Insurance Coverage. Insured shall obtain insurance of the types and in the amounts described below.

- Commercial General and Umbrella Liability Insurance. Insured shall maintain commercial general liability (CGL) and, if necessary, commercial umbrella insurance with a limit of not less than \$1,000,000 each occurrence and in the aggregate. If such CGL insurance contains a general aggregate limit, it shall apply separately by location and shall not be less than \$1,000,000. CGL insurance shall be written on standard ISO occurrence form (or a substitute form providing equivalent coverage) and shall cover liability arising from premises, operations, independent contractors, products-completed operations, personal injury and advertising injury, and liability assumed under an insured contract including the tort liability of another assumed in a business contract. Coverage for camp participants shall be included. Waiver of subrogation language shall be included. If necessary to provide the required limits, the Commercial General Liability policy's limits may be layered with a Commercial Umbrella or Excess Liability policy.
- Commercial Auto Insurance. Insured shall maintain a Commercial Automobile Policy with a Combined Single Limit of not less than \$1,000,000; Underinsured and Uninsured Motorists limit of not less than \$1,000,000; Comprehensive; Collision; and a Medical Payments limit of not less than \$5,000. Coverage shall include Non-Owned and Hired Car coverage. Waiver of subrogation language shall be included.
- Business Personal Property and/or Personal Property. Insured shall purchase insurance to cover Insured's personal property. In no event shall Certificate Holder be liable for any damage to or loss of personal property sustained by Insured, whether or not insured, even if such loss is caused by the negligence of Certificate Holder, its employees, officers or agents.
- Workers' Compensation. Insured shall maintain all statutorily required Workers Compensation coverages. Coverage shall include Employer's Liability, at minimum limits of \$100,000 / \$500,000 / \$100,000.
- Professional Liability. Insured shall maintain Professional Liability (Errors & Omissions) insurance on a claims made basis, covering claims made during the policy period and reported within three years of the date of occurrence. Limits of liability shall be not less than one million dollars (\$1,000,000).

If you have additional questions, please contact:

Risk Management,
University of Idaho.
PH (208) 885-6177
risk@uidaho.edu

CERTIFICATE of INSURANCE

AIA[®] Document G715[™] – 2017

Supplemental Attachment for ACORD Certificate of Insurance 25

By Reference

The printed document "Supplemental Attachment for ACORD Certificate of Insurance 25, AIA Document G715 - 2017", included herein by reference, or insurance company's standard approved form, together with one (1) duplicate copy of all applicable insurance policies covered by the certificate, shall be provided to the Owner by the Contractor to whom a contract is awarded within ten (10) calendar days after execution of the Contract Agreement, and prior to any work being done on the project by the Contractor.

Printed company forms, approved by The American Institute of Architects and so verified, may be used in lieu of AIA Document A715 - 2017. Four (4) copies shall be executed by an insurance company duly authorized to conduct business in the State of Idaho, and satisfactory to the Owner.

Upon compliance with insurance requirements, and when properly executed, same shall become a part of the contract documents.

Refer to Article 11 of the Supplemental Conditions to the Contract for Construction.

Copies of AIA Document A715 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF CERTIFICATE OF INSURANCE

PERFORMANCE BOND and PAYMENT BOND

AIA[®] Document A312[™] – 2010

Performance Bond

By Reference

The printed document “Performance and Labor and Material Payment Bond, AIA Document A312 - 2010”, included herein by reference, shall be used in the amount of 100% of the Contract.

Attorneys-in-fact who sign Performance and Labor and Material payment bonds shall be licensed in the State of Idaho and must file with each bond a certified and effectively dated copy of their power-of-attorney forms to Bidders for their use.

Refer also to Section 11.4 “Performance Bond and Payment Bond” of the General Conditions to the Contract for Construction and as modified by the Supplemental Conditions to the Contract for Construction.

Copies of AIA Document A312 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF PERFORMANCE BOND and PAYMENT BOND

CERTIFICATE of SUBSTANTIAL COMPLETION

 **AIA[®] Document G704[™] – 2017**

Certificate of Substantial Completion

By Reference

The printed document “Certificate of Substantial Completion, AIA Document G704 - 2017”, is included herein by reference, and shall apply to the Contract.

The Certificate of Substantial Completion form shall, upon completion of the Work, be furnished by the Architect to the Contractor, and when properly executed by all parties thereto, shall identify the contract warranty period and the Owner’s obligations upon acceptance of the Work.

Copies of AIA Document G704 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF CERTIFICATE OF SUBSTANTIAL COMPLETION

CONTRACTOR'S AFFIDAVIT of PAYMENT of DEBTS and CLAIMS

 **AIA[®] Document G706[™] – 1994**

Contractor's Affidavit of Payment of Debts and Claims

By Reference

The printed document "Contractor's Affidavit of Payment of Debts and Claims, AIA Document G706 - 1994", is included herein by reference, and shall apply to the Contract.

The Contractor's Affidavit of Payment of Debts and Claims form shall, upon completion of the Work, be furnished by the Architect to the Contractor, and when properly executed, shall become a part of the contract documents.

Copies of AIA Document G706 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF CONTRACTOR'S AFFIDAVIT of PAYMENT of DEBTS and CLAIMS

CONTRACTOR'S AFFIDAVIT of RELEASE of LIENS

 **AIA[®] Document G706A[™] – 1994**

Contractor's Affidavit of Release of Liens

By Reference

The printed document "Contractor's Affidavit of Release of Liens, AIA Document G706A - 1994", is included herein by reference, and shall apply to the Contract.

The Contractor's Affidavit of Release of Liens shall, upon completion of the Work, be furnished by the Architect to the Contractor, and when properly executed, shall become a part of the contract documents.

Copies of AIA Document G706A are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF CONTRACTOR'S AFFIDAVIT of RELEASE of LIENS

CONSENT of SURETY to FINAL PAYMENT

 **AIA[®] Document G707[™] – 1994**

Consent of Surety to Final Payment

By Reference

The printed document “Consent of Surety to Final Payment, AIA Document G707 - 1994”, is included herein by reference, and shall apply to the Contract.

The Consent of Surety to Final Payment shall, upon completion of the Work, be furnished by the Architect to the Contractor, and when properly executed, shall become a part of the contract documents.

Copies of AIA Document G707 are available for review at the offices of Architectural & Engineering Services at the University of Idaho. Full samples of AIA Documents may be viewed and / or downloaded at the following:

<https://www.aiacontracts.org/contract-doc-pages/82156-all-contract-documents>

END OF CONSENT of SURETY to FINAL PAYMENT

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ENUMERATION of CONTRACT DRAWINGS and SPECIFICATIONS

This document, Enumeration of Contract Drawings and Specifications, shall be included as an Exhibit to the Standard Form of Agreement Between Owner and Contractor, AIA Document A101 – 2017, as modified by the Supplemental Conditions to the Agreement.

PROJECT NAME: **RINKER ROCK CREEK RANCH BARN REMODEL**
University of Idaho

UI PROJECT No.: CP240031

LIST OF DRAWINGS: (AIA A101-2017, Paragraph 9.1.5)

General

G001 Cover Sheet
G002 Fire & Life Safety Summary
G003 Energy Compliance

Civil

1 of 4 Civil Cover
2 of 4 General Notes / Testing Sheet
3 of 4 Grading Plan
4 of 4 Best Management Practices

Structural

S1.1 General Structural Notes
S1.2 Special Inspections
S2.1 Foundation Plan
S2.2 Lower Roof Framing Plan
S2.3 Upper Roof Framing Plan
S3.1 Structural Details
S4.1 Structural Details
S5.1 Structural Details

Architectural

AD101 Demolition Site Plan
A101 Site Plan
A111 Floor Plan Clerestory Plan
A121 Reflected Clg. Plan Upper Roof Plan
A201 Building Elevations
A211 Interior Elevations
A212 Interior Elevations
A301 Building Sections
A501 Assemblies
A502 Details
A503 Details

A601 Door Schedule Room Finish Schedule

Mechanical

M0.0 Mechanical Cover Sheet

M0.1 Mechanical Schedules

M1.1 Mechanical Plan

Electrical

E0.0 Electrical Cover Sheet

E0.1 Energy Code Compliance

E1.1 Lighting Plan

E2.1 Power Plan

E2.2 Power Plan – Roof

E3.1 Single-Line Diagram

E3.2 Panel Schedules

LIST OF SPECIFICATIONS: (AIA A101-2017, Paragraph 9.1.6)

I. BIDDING REQUIREMENTS

Advertisement for Bids

Notice to Contractors

Instructions to Bidders; AIA A701 – 1997 (By Reference)

UI Supplementary Conditions to AIA A701 - 1997

Substitution Request Form

Bid Proposal

Contractor's Affidavit Concerning Alcohol and Drug-Free Workplace

Bid Bond; AIA A310 – 2010 (By Reference)

Power of Attorney

II. CONTRACT REQUIREMENTS

Agreement between Owner and Contractor; AIA A101 – 2017 (By Reference)

UI Supplementary Conditions to AIA A101 - 2017

General Conditions of the Contract for Construction; AIA A201 – 2017 (By Reference)

UI Supplementary Conditions to AIA A201 – 2017

Public Works Contract Report, WH-5

Referenced Forms:

Contractor's Affidavit Concerning Taxes

UI Request for Certificate of Insurance

Certificate of Insurance; AIA G715 – 2017 (By Reference)

Performance Bond and Payment Bond; AIA A312 – 2010 (By Reference)

Certificate of Substantial Completion; AIA G704 – 2017 (By Reference)

Affidavit of Payment of Debts and Claims; AIA G706 – 1994 (By Reference)

Contractor's Affidavit of Release of Liens; AIA G706A – 1994 (By Reference)

Consent of Surety Company to Final Payment; AIA G707 – 1994 (By Reference)

Enumeration of Contract Drawings and Specifications

III. TECHNICAL SPECIFICATIONS

DIVISION 0 – PROCUREMENT AND CONTRACTING REQUIREMENTS

Section 003132 Geotechnical Data
Geotechnical Investigation

DIVISION 1 - GENERAL REQUIREMENTS

Section 011000 Summary
Section 012500 Substitution Procedures
Section 012600 Contract Modification Procedures
Section 012900 Payment Procedures
Section 013100 Project Management and Coordination
Section 013200 Construction Progress Documentation
Section 013300 Submittal Procedures
Section 014000 Quality Requirements
Section 014200 References
Section 015000 Temporary Facilities and Controls
Section 016000 Product Requirements
Section 017300 Execution
Section 017700 Closeout Procedures
Section 017823 Operation and Maintenance Data
Section 017839 Project Record Documents
Section 017900 Demonstration and Training

DIVISION 2 – EXISTING CONDITIONS

Section 024116 Structure Demolition

DIVISION 3 – CONCRETE

Section 033000 Cast-In-Place Concrete

DIVISION 4 – MASONRY – NOT USED

DIVISION 5 - METAL

Section 055000 Metal Fabrications

DIVISION 6 - WOOD AND PLASTIC

Section 061000 Rough Carpentry
Section 061600 Sheathing
Section 061753 Shop-Fabricated Wood Trusses
Section 062013 Exterior Finish Carpentry
Section 064116 Plastic-Laminate-Clad Architectural Cabinets

DIVISION 7 - THERMAL & MOISTURE PROTECTION

Section 072100 Thermal Insulation

Section 072119	Foamed-In-Place Insulation
Section 072600	Vapor Retarders
Section 074113	Standing-Seam Metal Roof Panels
Section 076200	Sheet Metal Flashing and Trim
Section 078413	Penetration Firestopping
Section 079200	Joint Sealants

DIVISION 8 - OPENINGS

Section 081113	Hollow Metal Doors and Frames
Section 083113	Access Doors and Frames
Section 083613	Sectional Doors
Section 085113	Aluminum Windows
Section 087100	Door Hardware
Section 088000	Glazing

DIVISION 9 - FINISHES

Section 092900	Gypsum Board
Section 096513	Resilient Base and Accessories
Section 099114	Exterior Painting (MPI Standards)
Section 099124	Interior Painting (MPI Standards)

SECTION 10 – SPECIALTIES

Section 104416	Fire Extinguishers
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DIVISION 11 – BUILDING EQUIPMENT

Section 113013.01	Appliances
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DIVISION 12 - FURNISHINGS

Section 122413	Roller Window Shades
Section 123653	Laboratory Worksurfaces

DIVISION 13 - SPECIAL CONSTRUCTION – NOT USED

DIVISION 14 - CONVEYING SYSTEMS – NOT USED

DIVISION 21 – FIRE SUPPRESSION

Section 212000	Fixed Aerosol Fire-Extinguishing System
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DIVISION 22 – PLUMBING – NOT USED

DIVISION 23 – HEATING VENTILATION and COOLING

Section 230500	Common Work Results for HVAC
Section 233713	Grilles and Louvers
Section 238239	Electrical Wall Heaters

DIVISION 26 - ELECTRICAL

Section 260500	Common Work Results for Electrical
Section 260504	Documentation
Section 260505	Firestopping
Section 260519	Wire and Cable
Section 260526	Grounding
Section 260529	Supporting Devices
Section 260534	Raceways
Section 260535	Boxes
Section 260553	Electrical Identification
Section 262416	Panelboards
Section 262726	Wiring Devices
Section 263100	Photovoltaic Collectors
Section 265100	Interior Lighting

DIVISION 27 – COMMUNICATIONS – NOT USED

DIVISION 28 – ELECTRONIC SAFETY and SECURITY – NOT USED

DIVISION 31 - EARTHWORK – NOT USED

DIVISION 32 – EXTERIOR IMPROVEMENTS – NOT USED

DIVISION 33 - UTILITIES – NOT USED

DIVISIONS 34-48 – NOT USED

END OF ENUMERATION OF CONTRACT DRAWINGS AND SPECIFICATIONS

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PART III – TECHNICAL SPECIFICATIONS

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**DIVISION 00 - PROCUREMENT AND CONTRACTING
REQUIREMENTS**

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DOCUMENT 003132 - GEOTECHNICAL DATA

1.1 GEOTECHNICAL DATA

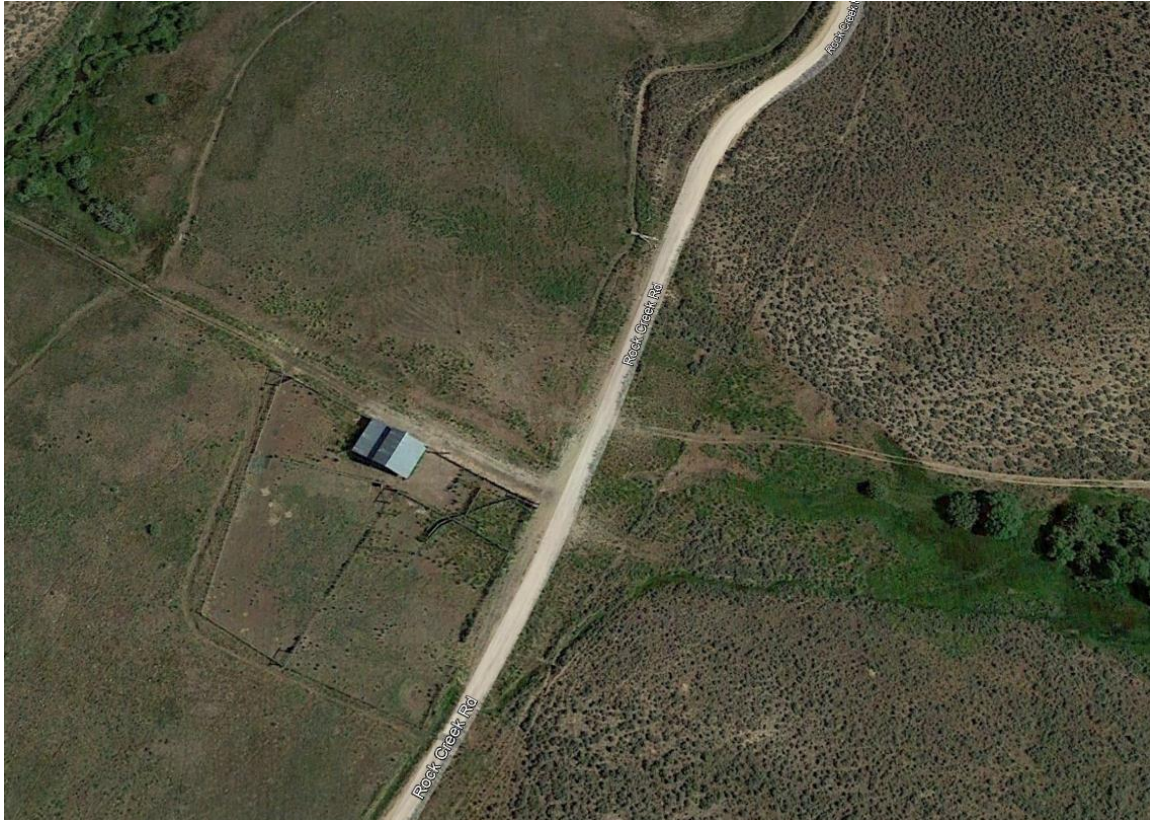
- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. A geotechnical investigation report for Project, titled *Geotechnical Investigation for Ethan O'Brien, Rinker Rock Creek Ranch Barn* prepared by HLE, Inc. dated 9 January 2024, is available for viewing as appended to this Document.
 - 1. The terms "Report", "Soils Report" or "Geotechnical Report" used herein or on the Drawings shall be defined as the item listed above.
- C. The purpose of subsurface investigation was to attempt to determine below-grade conditions by inspecting and testing representative samples recovered from borings. Such data is intended only to represent conditions at the locations of and at the time of the actual test borings and soils studies. The Owner, Architect and the geotechnical engineers do not assume any responsibility or liability for the accuracy or completeness of subsurface information. The Contractor is to use the Report according to his judgment, and he acknowledges that he is not relying upon the Report as an accurate or complete description of the subsurface conditions that may be encountered.
- D. The Contractor shall review the Report and Construction Documents for discrepancies. Any discrepancies between the Report and the Construction Documents shall be discussed with the Architect prior to beginning the Work.
- E. If, during construction, subsurface conditions differing from those encountered in the test samples are observed, notify Architect immediately and await his decision before proceeding.

END OF DOCUMENT 003132

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GEOTECHNICAL INVESTIGATION

FOR
Ethan O'Brien
Rinker Rock Creek Ranch Barn



**PREPARED BY
HLE, INC.**

101 S. Park Ave. #210
Idaho Falls, Idaho 83402
(208) 524-0212

800 West Judicial Street
Blackfoot, Idaho 83221
(208) 785-2977

DEVELOPMENT & DESIGN SURVEY
MATERIALS TESTING & INSPECTION
GEOTECHNICAL & ENVIRONMENTAL
CIVIL & STRUCTURAL ENGINEERING



LAND SURVEYING | 3D SCANNING | DESIGN SURVEYING
CIVIL AND STRUCTURAL ENGINEERING | MATERIALS TESTING

January 9, 2024

Project #: 23-614

Attn: Ethan O'Brien, NCARB

Re: **Rinker Rock Creek Ranch Barn**

Mr. O'Brien,

In accordance with your request, HLE, Inc. has completed a Geotechnical Investigation for your property in Blaine County, ID. The purpose of the investigation was to define the characteristics of the soil so that satisfactory substructures can be designed to support the proposed facilities.

It has been a pleasure working with you on this project. Please feel free to contact us about any questions you may have. As a valued client, please let us know how we can better serve your needs. We look forward to working with you on any of your future Civil, Geotechnical or Environmental Engineering projects.

Please feel free to contact us about any questions you may have.

Respectfully Submitted,

HLE, INC.

A handwritten signature in blue ink that reads "Andrew Ferguson". The signature is fluid and cursive.

Andrew Ferguson, P.E.



1-9-24

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APPENDICES

- Appendix A - Vicinity Maps, Test Hole Map, and Photos
- Appendix B - Hole Logs and Laboratory Test Data
- Appendix C - ASFE Report

1 Executive Summary

The executive summary provides a brief report of the results of our site investigation, field and laboratory tests, and our analysis and recommendations. This is only a summary and should be read in conjunction with the entire report for correct interpretation of the overall investigation. Based on the data obtained from the test holes and laboratory tests, it is our opinion that the area of the site, as displayed on the Test Hole Map found in Appendix A, is suitable for the proposed structures.

Groundwater Conditions:

Groundwater was not encountered in our investigation.

Subsurface Soils:

Soil Classification	Depths Encountered (Feet)	Net Allowable Bearing Capacity (FOS = 3)
Silty Sand (SM)	0-10	2,000 lbs/ft ²

Building Foundations:

Based on data obtained from the test holes and laboratory tests, it is our opinion that the site is suitable for support of the proposed structure that will place a bearing load less than or equal to the 2,000 psf using conventional spot and spread footings bearing directly on re-compacted subsurface material. Exposed subgrade material should be compacted to a minimum of 92% of the maximum density per ASTM D-1557 prior to placement of the structural footings.

Building Floor Slabs:

Areas of the site within the building areas should be excavated to sufficient depths to remove all topsoil and organic material. Any over-excavation should be replaced with structural fill. The exposed subgrade material should be re-compacted to a minimum of 92% of the maximum density per ASTM D-1557. A clean, free draining granular material should be installed below all slabs on grade. This material should be a minimum of six inches and compacted to a minimum 95% of the maximum density as determined by ASTM D-1557.

Gravel Parking Areas and Drive Areas:

Areas of the site where vehicle parking or vehicle access will be located should be excavated to sufficient depths to remove all topsoil and organic material. The exposed subgrade should be compacted to a minimum of 92% of the maximum density per ASTM D-1557. Place 12 inches of compacted pit run sub-base and compact to a minimum of 95% of maximum density per ASTM D-1557. Lastly place a minimum of 4 inches of ¾" minus crushed aggregate over the compacted pit run sub-base and compact to a minimum of 95% of the maximum density per ASTM D-1557.

2 Introduction

2.1 Purpose and Detailed Scope-of-Service

Our purpose in conducting a soils investigation is to accurately define and evaluate subsurface soil, bedrock, and ground water conditions in the areas of proposed construction, and to describe the engineering geology of the site. This information is used to provide appropriate recommendations for the design of the proposed site elements. This investigation included subsurface exploration, soil sampling and testing, laboratory testing, and engineering analysis and report preparation. The investigation also included review of local geological studies and records, and visual inspection of the site.

The scope of our field exploration included logging and sampling from the proposed site. The locations of the test holes are shown in Appendix A under Test Hole Location Map.

2.2 Project Description

The proposed sites at the time of the investigation consisted of an existing barn structure and wood fences. We understand that the existing structure is to be deconstructed and re-build using salvaged materials from the previous structure. The magnitude of foundation loads was not available to HLE at the time of this report.

2.3 Limitations, Exceptions, and User Reliance

The results of our investigation, along with pertinent recommendations for the estimated strength characteristics of the soils, are outlined in this report. The Associated Soil and Foundation Engineers (ASFE) (now known as the Geoprofessional Business Association (GBA)) has prepared information regarding geotechnical reports and a copy of that information has been attached for your review (Appendix C).

The user of this report may rely on its findings as they assess the condition of subsurface soils on these sites. In our opinion, the information gathered in this study is reliable but HLE, Inc. cannot guarantee that it is absolute or exactly precise; our conclusions are based on the parameters within which the investigation was conducted. No geotechnical investigation can wholly eliminate uncertainty regarding the soils in connection with the target property. The investigation is intended to reduce, but not eliminate, ambiguity regarding the potential to subsurface conditions in connection with a property. The Geotechnical Engineer should be contacted if the field conditions differ from those encountered during this investigation.

3 Site Description

3.1 Site Location and Current Property Use

The site is located within the SW $\frac{1}{4}$ of the NE $\frac{1}{4}$ of Section 26, Township 1N, Range 17 E of the Boise Principal Meridian in Blaine County, ID. The approximate GPS coordinates to the project location are: 43.390429, -114.392013.

The property has an existing barn structure and existing fencing. The remainder of the property is undeveloped.

3.2 Descriptions of Structures, Roads, Other On-Site Improvements

The proposed site improvements will consist of a re-built barn structure and associated infrastructure:

- Concrete pads (as required)
- Solar panels for power generation
- Vaulted toilets
- Propane gas tanks for heat
- Gravel parking areas

3.3 Site Geology

The project is in the Richardson Summit Quadrangle in Idaho. There are no documented Quaternary faults within the immediate vicinity of the project location as shown on the interactive U.S. Quaternary Fault provided by the US Geological Survey.

The major geologic units as documented on the Blaine County geologic map may consist of:

- TMV: Miocene felsic volcanics.
- Kgdh: Cretaceous granitic rocks of the hornbele-biotite suite; granite, granodiorite and megacrystic granodiorite aged around 90 to 90 Ma.

A *Custom Soil Resource Report* conducted by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) classifies and identifies various shallow soil types for the site. Typical soil profiles as shown on the web soil survey consist of:

- Loam (SC-SM, SM): 0-12 inches
- Clay loam (SC-SM, SW-SM, GM, SC, SM): 12 to 52 inches
- Sandy loam (GC-GM, GW, GM, GM, SM): 52 to 64 inches

These surface soils are generally consistent with visual inspection and test samples taken. Our findings show that the soil was Silty Sand for the full depth of our test holes (up to 10 feet deep).

The soils are shown as having a hydrologic soil group A which correlates to soils having a high infiltration rate when thoroughly wet. The reported capacity of the most limiting layer to transmit water varies between 2.00 to 6.00- inches per hour.

3.4 Seismicity

The project is found within seismic design category D as set forth in ASCE 7-22 for a Soil Site Class D. The following table defines the seismic design criteria for the site.

Seismic Design Summary			
S_s	0.38	S_{D1}	0.21
S₁	0.12	T _L	6
S_{MS}	0.56	PGA_M	0.21
S_{M1}	0.32	V _{S30}	260
S_{DS}	0.37	Risk Category	II

4 Field Exploration

4.1 Exploration Summary

HLE completed a field exploration on November 20, 2023 to determine the subsurface soil's location and estimate the subsurface soil's engineering characteristics. The investigation was conducted by excavating two test holes up to approximately 10 feet in depth. The test holes were completed using a backhoe excavator. Soils encountered during excavation were logged by our onsite representative, and bulk samples were obtained at depths appropriate to the investigation. Samples were taken to our laboratory for soil testing and classification.

Soil was not compacted during backfill. Test holes located below any structures will need to be re-excavated and backfilled in no more than twelve-inch (12") lifts and compacted to a minimum of 95% of the maximum density per ASTM D-1557.

4.2 Exploration Procedures

An experienced field technician supervised the exploration of the test holes. A continuous log of the subsurface conditions in the test holes was created (Appendix B), and a representative sample of each of the subsurface soils was collected, charted, and classified in the field using ASTM D 2488 (Unified Soil Classification System) as a guide.

4.3 Laboratory Testing

After the field investigation, a supplemental laboratory-testing program was conducted to estimate pertinent physical and engineering properties of the subsurface soil from bulk soil samples obtained. Laboratory tests were conducted according to current applicable American Society for Testing and Materials (ASTM) specifications. The following test methods and procedures were used:

- ASTM D4643 - Water Content
- ASTM D2488 - Classification of Soils for Engineering Purposes
- ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates
- ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils
- ASTM C117 - Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregate by Washing
- ASTM D4318 Atterberg Limits Test
- ASTM D1140 - Hydrometer Analysis

Soils logs generated by the field and lab investigation include soil strata, groundwater conditions, and general information regarding each test hole. A continuous log of the subsurface conditions in the test holes was created, and each of the subsurface soils was charted and classified. The excavation log, gradation curves, and soil classifications can be seen in Appendix B.

4.4 Supplemental Information

NA.

4.5 Subsurface Soils

Test holes were dug up to a depth of ten feet (10'). The following table depicts the soils encountered and their recommended strength characteristics. The recommended engineering design properties are provided in the table below.

Soil Classification	Internal Angle of Friction (Φ)	Tan Φ	Passive Pressure Coefficient	Coefficient of Friction
Silty Sand (SM)	29	0.55	1.44	0.28

4.6 Groundwater

Groundwater was not encountered in any of the test holes during excavation. There were no nearby wells in the vicinity of the project that would likely reflect actual groundwater elevations at the site. Actual depths to water may vary based on seasonal variations. We do not anticipate groundwater issues during construction based on our investigation. HLE should be contacted if conditions during construction differ from those encountered during our investigation.

5 Foundation Recommendations

5.1 Bearing Capacity

In providing foundation recommendations for the proposed site, consideration has been given for spot and spread footings bearing on re-compacted silty sand (SM) for an allowable bearing capacity of 2,000 psf. All topsoil should be excavated exposing the native soils which should be recompact to 92% of maximum density as determined by ASTM D-1557. If a higher bearing capacity is required, then HLE should be contacted for the design of an appropriate structural ballast beneath the structures.

Any structural fill shall be in accordance with the structural fill portion of this report and be compacted to a minimum 95% of the maximum density as determined by ASTM D-1557.

All topsoil should be excavated removing all organic material prior to placement of footings. It is estimated that the depth required for removal of organic material is 8 inches.

Minimum footing depth is thirty-two inches from the bottom of footing to top of finished grade for frost protection per the Blaine County requirements. To accommodate potential subgrade inconsistencies, a minimum footing width of twenty-four inches should be specified for foundations regardless of loading.

It is recommended that the structure is not placed on topsoil. If any portion of the structure is to be placed on topsoil, it is recommended to have the topsoil removed and any foundations be placed on a compacted structural fill.

5.2 Structural Fill and Foundation Considerations

Placement of any fill material beneath the footing elevation, if necessary, should be accomplished with a GW or GP Class sandy gravel material, placed in lifts not exceeding eight inches (8") and compacted to a minimum of 95% of optimum dry density as determined by ASTM D-1557 "Modified Proctor." A qualified inspector approved by the

building official should verify the compaction. The fill should extend a minimum width of six inches beyond the footing at its base and should widen at an angle of 45° from the footing base to the bottom of the footing trench.

By limiting the total pressure on spread footings to the above-recommended capacities, differential settlement of footings should be within a half inch and total settlement should not exceed one inch. A settlement analysis was not included as part of this evaluation and would require additional laboratory testing of undisturbed samples. Under no circumstances should the footings be installed upon loose or saturated soil, sod, rubbish, construction debris, frozen soil, non-engineered fill, or other deleterious materials, or within ponded water.

If unsuitable soils such as rocks larger than twelve inches (12") in diameter, concrete, pipe, and other waste materials are encountered in any footing trench, they must be completely removed and replaced with compacted structural fill. If granular soils become loose or disturbed, they must be properly re-compacted before the footings are placed. It is recommended that site preparation be completed in accordance with Section 6.0 of this report.

Backfill behind foundation walls should be done with a two-inch (2") minus free draining material with less than 15% passing the #200 sieve.

We recommend that a geotechnical engineer or testing technician from HLE be contacted to observe the excavation and foundation preparation phases of the project to determine that actual conditions are compatible with those considered for this report and recommendations. Placement of all fill and foundation soil should be observed and tested to confirm that the proper density and depth has been achieved in accordance with this report.

6 Site Preparation and Compacted Fill Requirements

6.1 Site Preparation – Foundation and Floor Slab

Prior to placing any structures on the proposed site, any remaining demolition debris and organic materials should be stripped and removed from the proposed structure footprint.

The entire foundation footprint of any structure should be compacted to an in-place unit weight equal to at least 92.0% on native material and 95.0% on structural fill material of optimum dry density as determined by ASTM D-1557 and tested to verify that the specified density has been obtained prior to construction. Sufficient quality assurance testing should be performed to ensure that compaction specifications are complied with.

Under no circumstances should the footings be installed upon clay, loose or saturated soil, sod, rubbish, construction debris, frozen soil, non-engineered fill, or other deleterious materials, or within ponded water. If unsuitable soils are encountered, they must be removed and replaced with compacted structural fill. If granular soils become loose or disturbed, they must be properly re-compacted before the footings are placed.

Placement of any fill material beneath the footing elevation, if necessary, should be accomplished with a GW or GP Class sandy gravel material, placed in lifts not exceeding

eight inches (8”) and compacted to a minimum of 95% of optimum dry density as determined by ASTM D-1557 “Modified Proctor.” A qualified inspector approved by the building official should verify the compaction.

All areas around the building perimeter shall be graded away from the foundation to ensure positive drainage away from the structure’s foundations. Excess moisture can reduce bearing capacities and cause excessive foundation settlement.

6.2 Wet Weather Construction

The natural soil is susceptible to changes in moisture content. During construction, the superficial soils may begin to pump and/or rut. If excessive precipitation creates a situation where the soil has excessive moisture beyond the optimum, construction technique will need to be modified. The following methods are for wet weather construction:

Restrict traffic over cleared and grubbed areas to tracked vehicles only. Restrict all rubber-tired vehicles from the proposed foundation and pavement areas.

If the moisture content of soils is determined to be too high, the exposed sub grade should be scarified and/or disked to aerate and accelerate the drying of the soils. This process should be repeated as necessary to reduce the moisture content to optimum levels. Once the material is dry it should be proof rolled before placing structural fill.

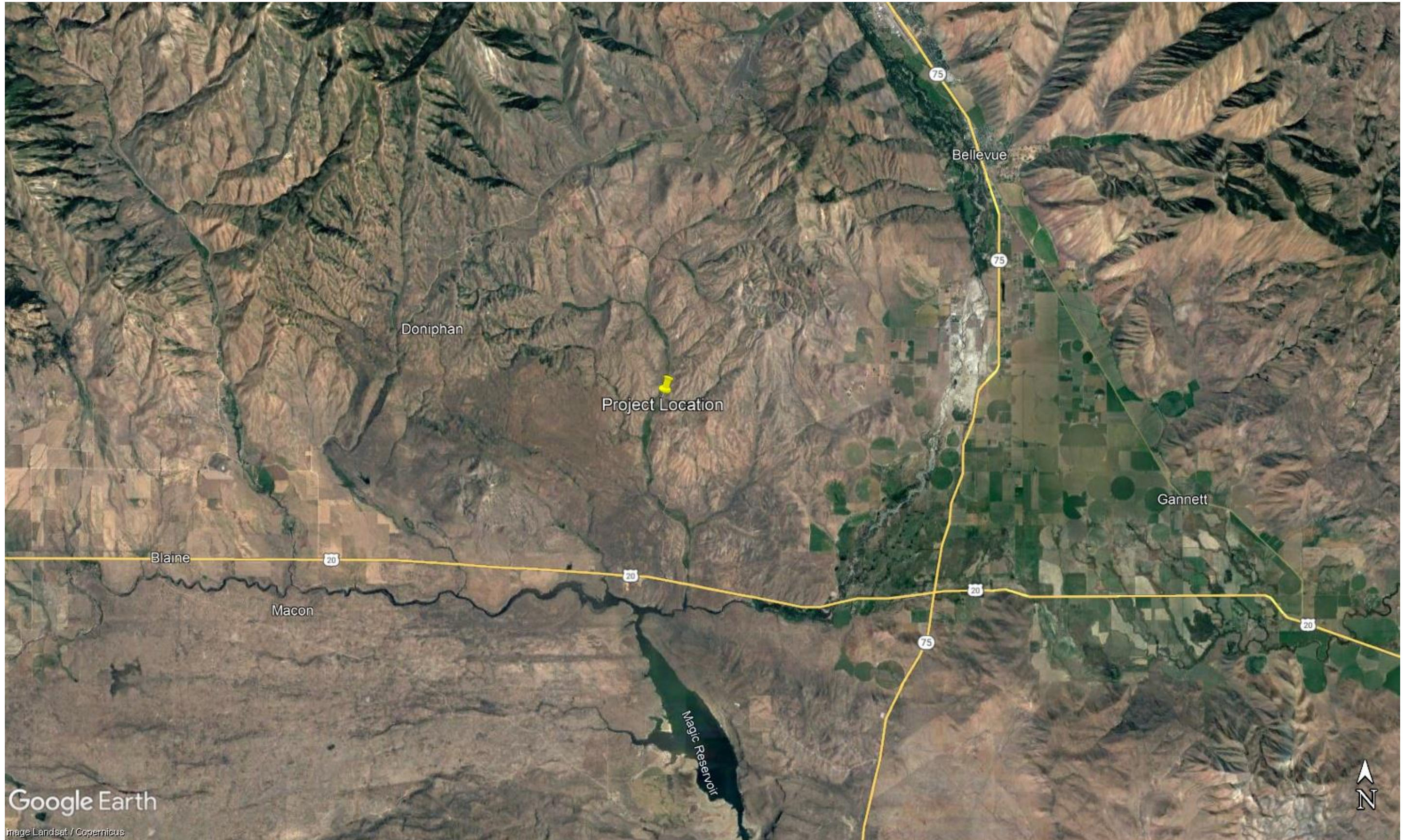
If these methods do not work, it may be necessary to over-excavate the problematic soils and import non-moisture sensitive sand and gravel. HLE should be contacted to evaluate site conditions and provide recommendations to the owner.

7 Conclusions

The conclusions and recommendations presented in this report are based upon the field and laboratory tests, which in our opinion define the characteristics of the subsurface material at the proposed sites in a satisfactory manner. Please refer to the ASFE information provided with this report concerning the use of your geotechnical evaluation. If during construction, conditions are encountered which appear to differ from those presented in this report, or if the site design layout is changed or significantly adjusted, it is requested that we be advised in order that the appropriate action, including revisions to this report, may be taken.

APPENDIX A

Vicinity Maps, Test Hole Map, and Photos



Google Earth

Image Landsat / Copernicus



Project Location

Google Earth





Google Earth

200 ft







APPENDIX B

Hole Logs and Laboratory Test Data



UNIFIED SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS	
			GRAPH	LETTER		
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES	
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES	
	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES	
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES	
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
				SO	CLAYEY SANDS, SAND - CLAY MIXTURES	
	FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
SILTS AND CLAYS		LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
				CH	INORGANIC CLAYS OF HIGH PLASTICITY	
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS	

USCS LEGEND 4/17/07

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

FIGURE 6

PROJECT NAME:	Rock Creek Geo	SHEET	1 OF 1
PROJECT NUMBER:	23-614	BOREHOLE NUMBER:	TH 1
LOCATION:	Hailey, Idaho		
TYPE OF DRILL RIG:	Mini Excavator	DRILLER:	Owner
HOLE SIZE:	10x10	HAMMER:	DROP:
DEPTH TO WATER:	Not Encountered	SURFACE ELEVATION:	
LOGGED BY:	Marissa Gerdes	DATE:	12/7/23 TO 12/7/23

DEPTH (FEET)	ELEVATION	SAMPLES	BLOW COUNTS	DESCRIPTION	GRAPHIC LOG	▲ MOISTURE (%)		
						10	20	30
						■ DRY DENSITY (PCF)		
						90	110	130
						* DEGREE OF SATURATION (%)		
						50	70	90
						◎ PLASTIC LIMIT (%)		
						10	20	30
						● LIQUID LIMIT (%)		
						20	40	60
2		Hand		Silty Sand SM				12.6
4		Hand		Silty Sand SM				10.1
8		Hand		Silty Sand SM				10.2

LAGNGN02_23-614.GPJ_LAGNGN02.GDT_1/5/24

HLE
 101 S Park Ave
 idaho falls, id 83404
 208-524-0212 Fax:

FIGURE:
1

PROJECT NAME:	Rock Creek Geo	SHEET	1 OF 1
PROJECT NUMBER:	23-614	BOREHOLE NUMBER:	TH 2
LOCATION:	Hailey, Idaho		
TYPE OF DRILL RIG:	Mini Excavator	DRILLER:	Owner
HOLE SIZE:	10x10	HAMMER:	DROP:
DEPTH TO WATER:	Not Encountered	SURFACE ELEVATION:	
LOGGED BY:	Marissa Gerdes	DATE: 12/7/23 TO 12/7/23	

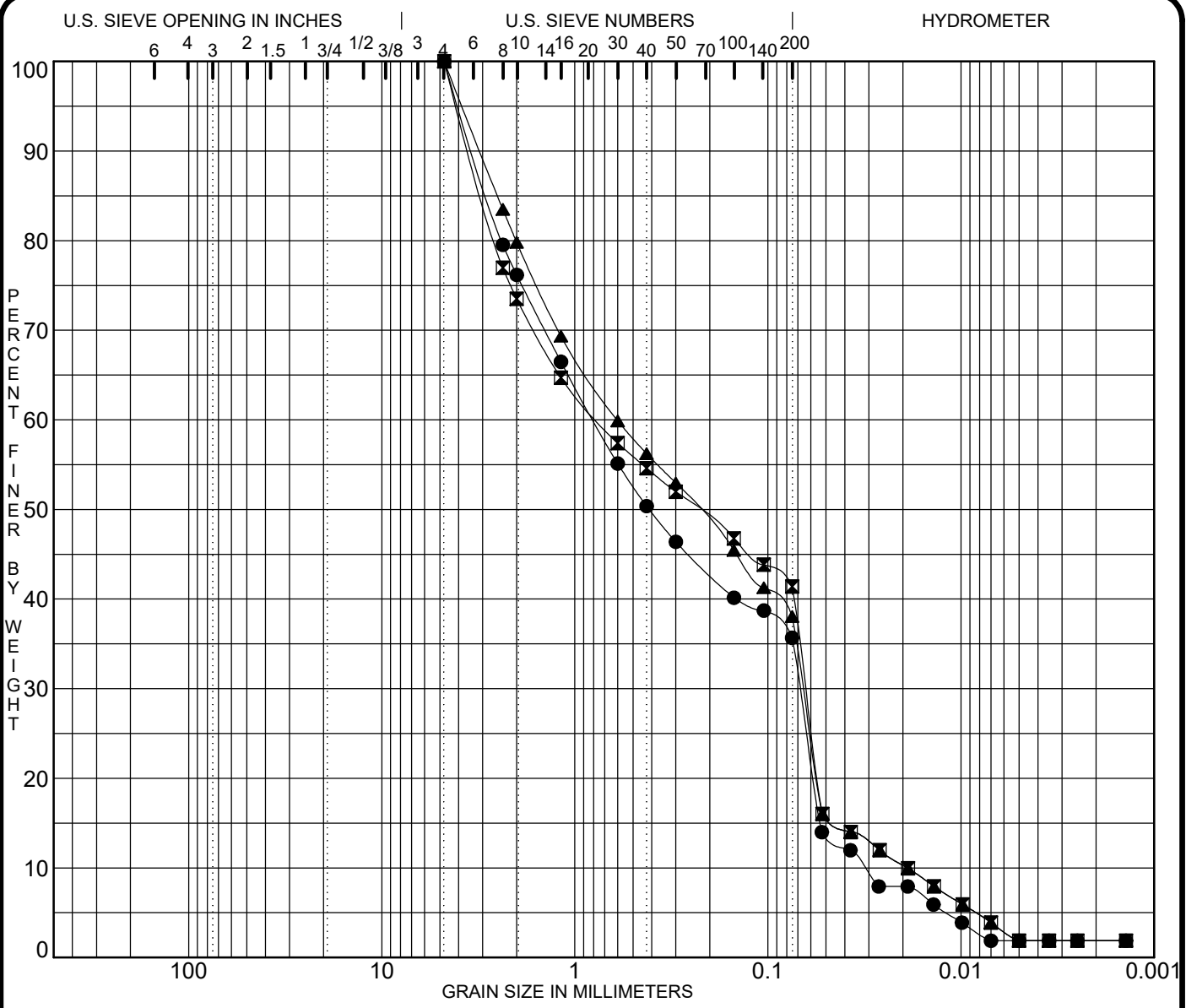
DEPTH (FEET)	ELEVATION	SAMPLES	BLOW COUNTS	DESCRIPTION	GRAPHIC LOG	▲ MOISTURE (%)		
						10	20	30
						■ DRY DENSITY (PCF)		
						90	110	130
						* DEGREE OF SATURATION (%)		
						50	70	90
						⊙ PLASTIC LIMIT (%)		
						10	20	30
						● LIQUID LIMIT (%)		
						20	40	60
				Silty Sand SM				
2				Silty Sand SM				
4				Silty Sand SM				
6				Silty Sand SM				
8				Silty Sand SM				
10				Silty Sand SM				
12								
14								

LAGNGN02_23-614.GPJ_LAGNGN02.GDT_1/5/24



HLE
 101 S Park Ave
 idaho falls, id 83404
 208-524-0212 Fax:

FIGURE:



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					MC%	LL	PL	PI	Cc	Cu
● TH 1 2.0	SILTY SAND SM					<	25	29	NP	0.18	25.3
☒ TH 1 5.0	SILTY SAND SM					<	26	25	NP	0.28	40.2
▲ TH 1 9.0	SILTY SAND SM					<	19	21	NP	0.38	31.9
						<					
						<					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● TH 1 2.0	4.75	0.80	0.068	0.0317	23.8	64.3	33.8	1.9
☒ TH 1 5.0	4.75	0.76	0.064	0.0190	26.5	58.6	39.5	1.9
▲ TH 1 9.0	4.75	0.60	0.066	0.0190	20.2	61.9	36.2	1.9

PROJECT Rock Creek Geo - Hailey, Idaho JOB NO. 23-614
 DATE 12/7/23

GRADATION CURVES

HLE
 idaho falls, id 83404

Figure No. 1

APPENDIX C

ASFE Report

Important Information About your Geotechnical Engineering Report

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than other factor. ASFE/ The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS.

Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts. Note, too that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations.

Keep your geotechnical consultant apprised of any such events.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS

Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas are not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

A REPORT RECOMMENDATIONS CAN ONLY BE PRELIMINARY

The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for your and expressly for purposes you indicated. No one other than you should apply this report for its intended purposes without first conferring with the geotechnical engineer. No party should apply this report for any purposes other than that originally contemplated without first conferring with the geotechnical engineer.

GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE

Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site. The equipment, techniques, and personnel used to perform a geoenvironmental exploration differ substantially from those applied in geotechnical engineering. Contamination can create major risks. If you have no information about the potential for your site being contaminated, you are advised to speak with your geotechnical consultant for information relating to geoenvironmental issues.

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid misinterpretations, retain your geotechnical engineer to work with other project design professionals who are affected by the geotechnical report. Have your geotechnical engineer explain report implications to design professionals affected by them, and then review those design professionals' plans and specifications to see how they have incorporated geotechnical factors. Although certain other design professionals may be familiar with geotechnical concerns, none knows as much about them as a competent geotechnical engineer.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE REPORT

Geotechnical engineers develop final boring logs based upon their interpretation of the field logs (assembled by site personnel) and laboratory evaluation of field samples. Geotechnical engineers customarily include only final boring logs in their reports. Final boring logs should not under any circumstances be redrawn for inclusion in architectural or other design drawing, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes, and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring logs misinterpretation, give contractors ready access to the complete geotechnical engineering report prepared or authorized for their use (If access is provided only to the report prepared for you, you should advise contractors of the reports limitations, assuming that a contractor was not one of the specific persons for whom

the report was prepared and that developing construction cost estimates was not one of the specific purposes for which it was prepared. In other words, while a contractor may gain important knowledge from a report prepared for another party, the contractor

would be well-advised to discuss the report with your geotechnical engineer and to perform the additional or alternative work that the contractor believes may be needed to obtain the data specifically appropriate for construction cost estimating purposes.) Some clients believe that it is unwise or unnecessary to give contractors access to their geotechnical engineering reports because they hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems. It also helps reduce the adversarial attitudes that can aggravate problems to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical engineers. To help prevent this problem, geotechnical engineers have developed a number of clauses for use in their contracts, reports, and other documents. Responsibility clauses are not exculpatory clauses designed to transfer geotechnical engineers' liabilities to other parties. Instead, they are definitive clauses that identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report. Read them closely. Your geotechnical engineer will be pleased to give full and frank answers to any questions.

RELY ON THE GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Most ASFE-member consulting geotechnical engineering firms are familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a construction project, from design through construction. Speak with your geotechnical engineer not only about geotechnical issues, but others as well, to learn about approaches that may be of genuine benefit. You may also wish to obtain certain ASFE publications. Contact a member of ASFE or ASFE for a complimentary directory of ASFE publications.

DIVISION 01 – GENERAL REQUIREMENTS

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Work restrictions.
5. Specification and Drawing conventions.
6. Miscellaneous provisions.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

- A. Project Identification: University of Idaho Rinker Rock Creek Ranch Barn Remodel.

1. Project Location: four miles north of Highway 20, Rock Creek Road, Fairfield, Idaho 83327.

- B. Owner: University of Idaho.

1. Owner's Representative: Ethan O'Brien, Project Manager (Moscow, ID)
2. Ranch Operations Manager: Cameron Weskamp (Picabo, ID)

- C. Architect: ZGA Architects & Planners, Chartered.

D. Architect's Consultants: Architect has retained the following design professionals, who have prepared designated portions of the Contract Documents:

1. Civil: HLE, Inc.
2. Structural: Ally Structural Consulting.
3. Mechanical: Engineering Consultants, Inc.
4. Electrical: Engineering Consultants, Inc.

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. Base Bid: the base bid shall include all demolition and construction work associated with the reconstruction of an existing 1,736 square foot agricultural barn. The barn will have a new reinforced concrete footings, foundations and slab floors with new wood structure, metal roofing, cementitious siding, aluminum framed windows, hollow metal doors and frames, overhead doors, and gypsum board interior wall finishes. Minor HVAC will used for night flushing; electrical lighting and outlets will be connected an lithium battery electrical system charged by solar panels and protected by an potassium aerosol fire suppression system.
2. Add Alternate Number 1: Single chamber vault toilet purchase, transportation and installation and roadside upgrades for accessibility.
3. Estimated cost of Project: \$800,000.00

B. Type of Contract:

1. Project will be constructed under a single prime contract.

1.6 CONTRACTOR'S USE OF SITE AND PREMISES

A. Limits on Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits on Use of Site: Confine construction, parking and staging operations to areas designated by the Owner. These areas are designated as "Easement Exceptions."
2. Roadways and main gate: Keep roadways and main gate clear and available to Owner, Students, Public and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

- B. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.
- C. Camping at the job site during the construction season will be allowed by the Owner, however all camping activities will be required to be restricted to within the "Easement Exception." The Contractor will be required to bring his/her own water and dispose of sewage at a dump station in Fairfield, Hailey or Picabo. Portable generators will be allowed with USFS approved spark arrestors and kept away from dry grasses.

1.7 COORDINATION WITH USERS

- A. Owner Usage of Site: Owner will use the property for research and ranching during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's research and ranching operations.
 - 1. Maintain access to gates and roadways to facilitate the movement of cattle from one pasture to another. Maintain gate closures at all times unless directed by the University otherwise.
 - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.8 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to between 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.
- C. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to cattle operations with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
- D. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances is not permitted.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, new model number replaces the specified model number, regulatory changes or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit one PDF or three paper copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use form provided at the end of this Section.
 - 2. Limit each request to one proposed substitution.
 - 3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties and specific

features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project.
 - j. Cost information, including a proposal of change, if any, in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
4. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Where allowed in individual Sections, equivalent products by other manufacturers shall be considered via a substitution request during the bid period.

- B. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the Contractor confirms in writing that the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 2. Contractor's Acknowledgements: By making requests for substitutions, the Contractor:
 - a. Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
 - b. Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
 - c. Certifies that the cost data represented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
 - d. Will coordinate the installation of the accepted substitution, making such changes as may be required for the Work to be complete in all respects.
- C. Substitutions for Convenience: Not allowed.
- D. Substitutions will not be considered when they are indicated or implied in submittals. To the maximum extent possible, substitution requests are to be reviewed and approved by the Architect prior to the submission of submittals.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

CONTRACTOR'S SUBSTITUTION REQUEST

(Use separate form for each request.)

Date: _____ Request No. _____

TO: ZGA Architects and Planners, Chartered
300 E. Mallard Ste. 325, Boise, Idaho 83706
Phone: (208) 345-8872 Fax: (208) 343-7162

PROJECT: University of Idaho Rinker Rock Creek Ranch Barn Remodel Project No. 2306.01

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 ITEM: _____

SAVINGS or CREDIT to OWNER for ACCEPTING SUBSTITUTE: \$ _____

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 affect on other trades, the construction schedule, or specified warranty requirements.
6. Maintenance and service parts will be locally available for the proposed substitution.

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: _____ 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: _____

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions" or other form provided by Architect.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 3. Indicate applicable taxes, delivery charges, equipment rental and amounts of trade discounts.
 4. Include costs of labor and supervision directly attributable to the change.
 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
 7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive (CCD): Architect may issue a Construction Change Directive on AIA Document G714 or form provided by Architect. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by a Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

- A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Contractor's name and address.
 - c. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703 or form providing equivalent information.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum. At a minimum, breakdown to include:
 - a. Include separate line item for administration costs.
 - b. Include separate line item for overhead.
 - c. Include separate line item for profit.
 - d. Include separate line item for superintendent.
 - e. Include separate line item for mobilization.
 - f. Include separate line item for temporary facilities and controls, and other non-direct costs.
 - g. Include separate line item for demobilization.
 - h. Include separate line item for Project closeout requirements.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site.
7. Each item in the schedule of values and Applications for Payment shall only include costs attributed for that portion of work and shall not include proportionate share of general overhead and profit.
8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial 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 Substantial Completion, and final Application for Payment involve additional requirements.

- B. **Payment Application Times:** The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- C. **Application for Payment Forms:** Use AIA Document G702 and AIA Document G703, or form providing equivalent information and approved by Architect.
- D. **Application Preparation:** Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. **Stored Materials:** Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. **Transmittal:** Submit one signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Submittal of PDF document via email is deemed as an original under this Contract. All PDFs shall be in color.
- G. **Waivers of Mechanic's Lien:** With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the 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 conditional final or full waivers.

3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors and suppliers for construction period covered by the previous application.
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 conditional final or full waivers.
 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Submittal schedule (preliminary if not final).
 5. List of Contractor's staff assignments.
 6. Copies of building permits.
 7. Certificates of insurance and insurance policies.
 8. Performance and payment bonds.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the 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 the Contract Sum.
 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims", or form providing equivalent information.
 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens", or form providing equivalent information.
 6. AIA Document G707, "Consent of Surety to Final Payment", or form providing equivalent information.
 7. Evidence that claims have been settled.

8. Final measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Requests for Information (RFIs).
 - 3. Project meetings.
- B. Related Requirements:
 - 1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.
- B. Extraneous RFIs: An RFI issued by the Contractor, where such information requested was available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A or form providing equivalent information. Include the following information in tabular form:
 - 1. Name, address and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including office and cellular telephone numbers and e-mail addresses. Provide names, addresses and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.
 - 2. Preparation of the schedule of values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
- C. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water and materials. Coordinate use of temporary utilities to minimize waste.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Project name.
 - 2. Date.
 - 3. Name of Contractor.

4. RFI number, numbered sequentially.
 5. RFI subject.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies and attachments on attached sketches.
- C. RFI Forms: RFI form will be provided in Word document and all RFIs are to be submitted in Word.
1. Attachments shall be electronic files in Adobe Acrobat PDF format. PDFs to be in color, when original of attachment contains color
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00PM will be considered as received the following working day.
1. The following Contractor-generated RFIs are considered to be extraneous and will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 - h. RFIs requesting information to correct construction errors.
 - i. RFIs requesting a change on behalf of the Owner.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response and prior to commencing with the direction provided by the RFI.
- E. Extraneous RFIs: Extraneous RFIs impose an undue burden on the Architect and the Architect's Consultants. Time incurred by the Architect and/or Consultants reviewing extraneous RFIs shall be deemed an additional service to the Owner/Architect Agreement and as such shall be invoiced as an additional service. Because RFIs are deemed critical they take priority over other responsibilities of the Architect and/or Consultant; therefore, because such priorities can result in overtime work, they shall be invoiced at twice the standard billing rate. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for the Architect and/or Consultants to evaluate and respond to extraneous RFIs.

- F. On receipt of Architect's response, immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
 - 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

- B. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires significant or unusual coordination with other construction.
 - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Possible conflicts.
 - i. Compatibility requirements.
 - j. Time schedules.
 - k. Weather limitations.
 - l. Manufacturer's written instructions.
 - m. Warranty requirements.
 - n. Compatibility of materials.
 - o. Acceptability of substrates.
 - p. Temporary facilities and controls.
 - q. Space and access limitations.
 - r. Regulations of authorities having jurisdiction.
 - s. Testing and inspecting requirements.
 - t. Installation procedures.
 - u. Coordination with other work.
 - v. Required performance results.
 - w. Protection of adjacent work.
 - x. Protection of construction and personnel.

3. Record significant conference discussions, agreements and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- C. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Architect, at Contractor's discretion each subcontractor, supplier and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period ("3-week look ahead").
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Status of submittals.
 - 3) Deliveries.
 - 4) Progress cleaning.
 - 5) Quality and work standards.
 - 6) Status of correction of deficient items.
 - 7) Field observations.
 - 8) Status of RFIs.
 - 9) Status of proposal requests.
 - 10) Pending changes.
 - 11) Status of Change Orders.
 - 12) Documentation of information for payment requests.
 4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

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SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Daily construction reports.
 - 3. Site condition reports.
 - 4. Special reports.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
 - 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
1. Working electronic copy of schedule file, where indicated.
 2. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- C. Site Condition Reports: Submit at time of discovery of differing conditions.
- D. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, payment requests, and other required schedules and reports.
1. Secure time commitments for performing critical elements of the Work from entities involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication and delivery.
 2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule.

3. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- D. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes and equipment required to achieve compliance, and date by which recovery will be accomplished.
- E. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed or the Notice of Award, if Notice of Award is issued for the Project. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
- C. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.
- E. Schedule Updating: Concurrent with making revisions to schedule, show the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (see special reports).
 - 10. Stoppages, delays, shortages and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.
 - 15. Construction Change Directives received and implemented.
 - 16. Services connected and disconnected.
 - 17. Equipment or system tests and startups.
 - 18. Partial completions and occupancies.
 - 19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.

- B. Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

EXECUTION

2.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule two days before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples and other submittals.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for substitution request requirements after bidding.
 - 2. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 3. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 4. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 5. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications and record Product Data.
 - 6. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
- C. Purpose of Submittals: Submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Submittals that are not required by the Contract Documents or the approved submittal log may be returned by the Architect without action.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

- C. Closeout Submittals: Written and graphic information that require Architect's review and approval. Closeout submittals are those submittals indicated in individual Specification Sections as "closeout submittals", operation and maintenance data, warranties, record documents, demonstration and training materials, certificates and maintenance materials. Closeout submittals are to be submitted at the time of Substantial Completion, unless specified otherwise in other Sections.
- D. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- E. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by Specification Section numbers. Include time required for review, ordering, manufacturing, fabrication and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Submit concurrently with the Contractor's construction schedule, but not more than 30 days after Notice To Proceed.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
 - 3. Format: Arrange the following information in a tabular format:
 - a. Specification Section number and title.
 - b. Scheduled date for initial submittal.
 - c. Column for actual date for initial submittal.
 - d. Submittal category: Action; informational, closeout.
 - e. Name of subcontractor.
 - f. Description of the Work covered.
 - g. Differentiate "Samples for Initial Selection" as a separate submittal from "Samples for Verification".

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: If requested, electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals, subject to the following requirements:
 - 1. Contractor shall determine which Drawings are desired and make only one request for Drawings.
 - a. Contractor shall pay directly to Architect a service fee of **\$50.00 per Drawing**.
 - 2. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings requested, for use in preparing Shop Drawings and Project record drawings.

- a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in Revit 2022 or AutoCAD legacy.
 - c. Contractor shall execute a data licensing agreement in the form provided by Architect.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 15 days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
- D. Electronic Submittals: To the maximum extent practical, provide electronic submittals in lieu of paper submittals. Identify and incorporate information in each electronic submittal file as follows:
1. To the maximum extent possible, electronic submittals are to be "written" as a PDF, not "scanned" as a PDF.
 2. All PDFs are to be in color.
 3. To the maximum extent possible, assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 4. Name file with submittal number, including revision identifier.
 - a. Submittal number shall use Specification Section number followed by an underscore and then a sequential number (e.g., 061000_01). Resubmittals shall include an alphabetic-numeric suffix using "R" for revision (e.g., 06100_-01-R1).
 5. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 6. Transmittal Form for Electronic Submittals: Include on transmittal, or provide locations on transmittal, for the following information:

- a. Project name.
 - b. Date.
 - c. Name of Contractor.
 - d. Specification Section number and title.
 - e. Drawing number and detail references, as appropriate.
 - f. Related physical samples submitted directly.
 - g. Remarks.
7. Metadata: Include the following information as keywords in the electronic submittal file metadata:
- a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form as initial submittal.
- 1. Note date and content of previous submittal.
 - 2. Note date and content of revision and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action.
 - 4. The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and one resubmittal. The Architect's review of additional submittals will be made as an additional service provided by the Architect to the Owner. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional resubmittals.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
- 1. Initial Submittals: The initial submittal form any given Specification Section shall include all items listed under that Section except items to be submitted after an initial

- selection is made, and except for closeout submittals. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
2. Make initial submittals within 60 calendar days after Notice to Proceed; closeout submittals and final submittals that are contingent to initial submittals are excluded from this requirement. Permit proper consideration and action on submittals before materials or items that submittal represent are ordered. Allow sufficient time so that no delay occurs due to required lead time in ordering or delivery to the job site.
 - a. No pay application beyond 60 days time limit will be processed until all outstanding shop drawings have been submitted.
 3. Submit electronic submittals via email as PDF electronic files.
 - a. Submit via email with attachments accumulative size not exceeding 10 megabytes. Where files exceed 10 megabytes submit by overnight delivery on a CD or DVD, or utilize an FTP site approved by the Architect.
 - b. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products, models, options and other data that are applicable. Supplement manufacturer's standard data to provide information unique to the Project.
 - a. Paper Copies: When paper copies are necessary to supplement electronic submittal, do not mark-up one "original" and then make the required number of copies, as this can result in important notations being overlooked by the Reviewer.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Shop

Drawings based on Architect's digital data drawing files are to indicate detailed information pertinent to the portion of the Work particularized by the Shop Drawing; a Shop Drawing that merely reiterates the Contract Drawings is not a Shop Drawing and will be discarded without review.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
2. Sheet Size: Except for templates, patterns and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches, and where appropriate the same size as the original Contract Drawings. Sheet size applies to the "plotted" size of PDF electronic files.

D. Samples: Submit Samples for review of kind, color, pattern and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures and patterns available. Where Samples for initial selection are specified, such samples are to be submitted with the initial submittal for that Specification Section; subsequently, Samples for verification are not included in the initial submittal for the Section.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected.

E. Manufacturer's Installation Instructions:

1. When specified in individual Specification Sections, submit printed instructions for delivery, storage, assembly, substrate preparation, installation, start-up, adjusting and finishing.
 2. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
 3. Recommendations for cleaning and protection.
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of Contractor's reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked and approved for compliance with the Contract Documents. The Contractor's stamp must indicate that the submittal is "approved" or "approved as noted" by the Contractor for inclusion into the construction of the Project. Submittals not marked as approved in this manner may be returned by the Architect without action.

3.2 ARCHITECT'S ACTION

- A. The term "Architect" as used in this Article shall include the Architect's consulting Engineers.
- B. Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- C. The submittal review by the Architect will be general in nature for the limited purpose of checking for conformance with information given and design concept expressed in Contract Documents. It shall not relieve the Contractor of responsibility for accuracy of such submittals, nor proper fitting, construction of work, compliance with specified characteristics, furnishing of materials, or work required by Contract Documents and not indicated on submittals. Submittal approval shall not be construed as approving departures from Contract Documents.
 - 1. Review of submittals shall not relieve the Contractor from responsibility for any violation indicated on such submittals of local, county, state or federal laws, rules, ordinances, or rules and regulations of commissions, boards or other authorities or utilities having jurisdiction.
 - 2. The review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences or procedures.
 - 3. The Reviewer's approval of a specific item shall not indicate approval of an assembly of which the item is a component, unless it has been specifically noted on the submittal by the Reviewer.
- D. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Reviewed submittals will indicate action, as follows (or with equivalent working by Architect's Consultants):
 - 1. "Reviewed": Final Unrestricted Release. Where submittals are marked "Reviewed", that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
 - 2. "Furnish as Noted": Final But Restricted Release. When submittals are marked "Furnish as Noted", that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
 - 3. "Rejected" or "Revise and Resubmit": Returned for Resubmittal. When submittal is marked "Rejected" or "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
 - a. Do not permit submittals marked "Rejected" or "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.

4. "Returned - Not Required": Where a submittal is provided that does not need to be reviewed by the Architect or Architect's Consultant, the submittal will be returned marked "Not Reviewed".
- E. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- F. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- G. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- H. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- D. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory or shop.

- E. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- F. Testing Agency: An entity engaged to perform specific tests, inspections or both. Testing laboratory shall mean the same as testing agency.
- G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.
- C. Contract Documents: If there appears to be a conflict between the Contract Specifications and the Contract Drawing, refer the conflicting requirements to Architect for a decision before proceeding. During bidding, if there is not ample time to receive resolution via Addendum, assume the more costly resolution in the bid.

1.5 INFORMATIONAL SUBMITTALS

- A. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Testing and Inspection: Include the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 2. Special inspections required by authorities having jurisdiction.
 3. Owner-performed tests and inspections indicated in the Contract Documents.
- B. Continuous Inspection of Workmanship: Provide continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified.
- C. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting or assembling work similar in material, design and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly or product that are similar in material, design and extent to those indicated for this Project.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design and extent to those indicated for this Project.

- H. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design and extent to those indicated for this Project.

1.9 QUALITY CONTROL

- A. **Owner Responsibilities:** Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. **Contractor Responsibilities:** Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. **Manufacturer's Technical Services:** Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

- F. Associated Services: Cooperate with agencies performing required tests, inspections and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections and similar quality-control services required by the Contract Documents.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Notifying Architect and Contractor immediately of irregularities and deficiencies observed in the Work during performance of its services. If observed irregularity or deficiency is observed while on site, notify the Contractor prior to leaving the site and notify the Architect on the same day.
 2. Submitting a certified written report of each test, inspection and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 4. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 5. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Owner's and Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 - 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 - 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 - 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 - 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 - 8. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
 - 12. AGA - American Gas Association; www.aga.org.
 - 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 - 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 15. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 16. AIA - American Institute of Architects (The); www.aia.org.
 - 17. AISC - American Institute of Steel Construction; www.aisc.org.
 - 18. AISI - American Iron and Steel Institute; www.steel.org.
 - 19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
 - 20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 21. ANSI - American National Standards Institute; www.ansi.org.
 - 22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
 - 23. APA - APA - The Engineered Wood Association; www.apawood.org.
 - 24. APA - Architectural Precast Association; www.archprecast.org.

25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASSP - American Society of Safety Professionals (The); www.assp.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
38. AWEA - American Wind Energy Association; www.awea.org.
39. AWI - Architectural Woodwork Institute; www.awinet.org.
40. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
41. AWWA - American Water Works Association; www.awwa.org.
42. AWS - American Welding Society; www.aws.org.
43. AWWA - American Water Works Association; www.awwa.org.
44. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
45. BIA - Brick Industry Association (The); www.gobrick.com.
46. BICSI - BICSI, Inc.; www.bicsi.org.
47. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
48. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
49. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
50. CDA - Copper Development Association; www.copper.org.
51. CE - Conformite Europeenne; <http://ec.europa.eu/growth/single-market/ce-marking/>.
52. CEA - Canadian Electricity Association; www.electricity.ca.
53. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
54. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
55. CGA - Compressed Gas Association; www.cganet.com.
56. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
57. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
58. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
59. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
60. CPA - Composite Panel Association; www.compositepanel.org.
61. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
62. CRRC - Cool Roof Rating Council; www.coolroofs.org.
63. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
64. CSA - CSA Group; www.csa-group.org.
65. CSI - Construction Specifications Institute (The); www.csiresources.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTA - Consumer Technology Association; www.cta.tech.

68. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
69. CWC - Composite Wood Council; (See CPA).
70. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
71. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
72. DHI - Door and Hardware Institute; www.dhi.org.
73. ECA - Electronic Components Association; (See ECIA).
74. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
75. ECIA - Electronic Components Industry Association; www.eciaonline.org.
76. EIA - Electronic Industries Alliance; (See TIA).
77. EIMA - EIFS Industry Members Association; www.eima.com.
78. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
79. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
80. ESTA - Entertainment Services and Technology Association; (See PLASA).
81. ETL - Intertek (See Intertek); www.intertek.com.
82. EVO - Efficiency Valuation Organization; www.evo-world.org.
83. FCI - Fluid Controls Institute; www.fluidcontrolsinstitute.org.
84. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
85. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
86. FM Approvals - FM Approvals LLC; www.fmglobal.com.
87. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
88. FRSA - Florida Roofing, Sheet Metal Contractors Association, Inc.; www.floridarroof.com.
89. FSA - Fluid Sealing Association; www.fluidsealing.com.
90. FSC - Forest Stewardship Council U.S.; www.fscus.org.
91. GA - Gypsum Association; www.gypsum.org.
92. GANA - Glass Association of North America; (See NGA).
93. GS - Green Seal; www.greenseal.org.
94. HI - Hydraulic Institute; www.pumps.org.
95. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
96. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
97. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
98. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
99. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
100. IAS - International Accreditation Service; www.iasonline.org.
101. ICBO - International Conference of Building Officials; (See ICC).
102. ICC - International Code Council; www.iccsafe.org.
103. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
104. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
105. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
106. IEC - International Electrotechnical Commission; www.iec.ch.
107. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
108. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
109. IESNA - Illuminating Engineering Society of North America; (See IES).
110. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
111. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
112. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.

113. II - Infocomm International; (See AVIXA).
114. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.com.
115. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
116. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
117. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
118. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
119. ISO - International Organization for Standardization; www.iso.org.
120. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
121. ITU - International Telecommunication Union; www.itu.int/home.
122. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
123. LMA - Laminating Materials Association; (See CPA).
124. LPI - Lightning Protection Institute; www.lightning.org.
125. MBMA - Metal Building Manufacturers Association; www.mbma.com.
126. MCA - Metal Construction Association; www.metalconstruction.org.
127. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
128. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
129. MHIA - Material Handling Industry of America; www.mhia.org.
130. MIA - Marble Institute of America; (See NSI).
131. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
132. MPI - Master Painters Institute; www.paintinfo.com.
133. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
134. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
135. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
136. NADCA - National Air Duct Cleaners Association; www.nadca.com.
137. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
138. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
139. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
140. NBI - New Buildings Institute; www.newbuildings.org.
141. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
142. NCMA - National Concrete Masonry Association; www.ncma.org.
143. NEBB - National Environmental Balancing Bureau; www.nebb.org.
144. NECA - National Electrical Contractors Association; www.necanet.org.
145. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
146. NEMA - National Electrical Manufacturers Association; www.nema.org.
147. NETA - InterNational Electrical Testing Association; www.netaworld.org.
148. NFHS - National Federation of State High School Associations; www.nfhs.org.
149. NFPA - National Fire Protection Association; www.nfpa.org.
150. NFPA - NFPA International; (See NFPA).
151. NFRC - National Fenestration Rating Council; www.nfrc.org.
152. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
153. NHLA - National Hardwood Lumber Association; www.nhla.com.
154. NLGA - National Lumber Grades Authority; www.nlga.org.
155. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).

156. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
157. NRCA - National Roofing Contractors Association; www.nrca.net.
158. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
159. NSF - NSF International; www.nsf.org.
160. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
161. NSPE - National Society of Professional Engineers; www.nspe.org.
162. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
163. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
164. NWFA - National Wood Flooring Association; www.nwfa.org.
165. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
166. PDI - Plumbing & Drainage Institute; www.pdionline.org.
167. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
168. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
169. RFCI - Resilient Floor Covering Institute; www.rfci.com.
170. RIS - Redwood Inspection Service; www.redwoodinspection.com.
171. SAE - SAE International; www.sae.org.
172. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
173. SDI - Steel Deck Institute; www.sdi.org.
174. SDI - Steel Door Institute; www.steeldoor.org.
175. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
176. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
177. SIA - Security Industry Association; www.siaonline.org.
178. SJI - Steel Joist Institute; www.steeljoist.org.
179. SMA - Screen Manufacturers Association; www.smainfo.org.
180. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
181. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
182. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
183. SPIB - Southern Pine Inspection Bureau; www.spib.org.
184. SPRI - Single Ply Roofing Industry; www.spri.org.
185. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
186. SSINA - Specialty Steel Industry of North America; www.ssina.com.
187. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
188. STI - Steel Tank Institute; www.steeltank.com.
189. SWI - Steel Window Institute; www.steelwindows.com.
190. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
191. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
192. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
193. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
194. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
195. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
196. TMS - The Masonry Society; www.masonrysociety.org.
197. TPI - Truss Plate Institute; www.tpinst.org.
198. TPI - Turfgrass Producers International; www.turfgrassod.org.
199. TRI - Tile Roofing Institute; www.tilerroofing.org.

200. UL - Underwriters Laboratories Inc.; www.ul.com.
201. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
202. USAV - USA Volleyball; www.usavolleyball.org.
203. USGBC - U.S. Green Building Council; www.usgbc.org.
204. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
205. WA - Wallcoverings Association; www.wallcoverings.org.
206. WASTEC - Waste Equipment Technology Association; www.wastec.org.
207. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
208. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
209. WDMA - Window & Door Manufacturers Association; www.wdma.com.
210. WI - Woodwork Institute; www.wicnet.org.
211. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities and security and protection facilities.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies and authorities having jurisdiction.
- B. Sewer Service: There are no sewer services at the site, Contractor to provide Porta-Pottis.
- C. Water Service: There are no water services at the site, Contractor to provide potable water for personal consumption and non-potable water for construction.
- D. Electric Power Service: There are no electrical services at the site, Contractor to provide generators for charging equipment, powering equipment and lighting.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Chain-Link Fencing: At the discretion of, and as selected by Contractor.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks and bookcases.
 - 2. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 3. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide electric unit heaters or vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, clean HVAC system as required in Section 017700 "Closeout Procedures".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities within area shown on plans. Limits of site disturbance are strictly limited by land-use agreements in place.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. Sanitary Facilities: Provide temporary toilets, wash facilities and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation and maintenance of fixtures and facilities.
- B. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- C. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- D. Electric Power Service: Provide stand-alone electric power service and distribution system of sufficient size, capacity and power characteristics required for construction operations.
- E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- F. Telephone Service: There is limited cell-phone service at the site. Locations near Highway 20 have been noted to have reception. Contractor's option to provide satellite cell phone for emergency service until Starink internet service is fully functional.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.

2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary vehicle access to the site.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
 - C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 - D. Parking: Provide temporary parking areas for construction personnel.
 - E. Project Signs: Provide Project sign. Unauthorized signs are not permitted.
 1. Identification Sign: Provide Project identification sign as coordinated with the Architect. At a minimum, sign to include Owner's name, Architect's name and Contractor's name.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 3. Maintain and touchup signs so they are legible at all times.
 - F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."
 - G. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 - H. Scaffolds and Platforms: As selected by Contractor and subject to the approval of the authority having jurisdiction.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway and subsoil contamination or pollution or other undesirable effects.
 1. Comply with work restrictions specified in Section 011000 "Summary."
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 1. Inspect, repair and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 2. Clean, repair and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- E. Site Enclosure Fence: At discretion of Contractor, before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- F. Security Enclosure and Lockup: At discretion of Contractor, install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security. Lock entrances at end of each work day.
- G. Barricades, Warning Signs and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.

3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace or clean stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Replace materials containing moisture levels higher than allowed.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may

have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle products using means and methods that will prevent damage, deterioration and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation and weather-protection requirements for storage.
 6. Protect stored products from damage and liquids from freezing.

7. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 1. Basis-of-Design Products: Provide the product specified. Equivalent products by other manufacturers shall be considered via a substitution request during the bid period.
 2. Provide products complete with accessories, trim, finish, fasteners and other items needed for a complete installation and indicated use and effect.
 3. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 4. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 5. Where products are accompanied by the term "as selected," Architect will make selection.
 6. Descriptive, performance and reference standard requirements in the Specifications establish salient characteristics of products.
 7. Or Equal: The terms "or equal" or "or approved equal" are not valid. Should the term "or equal" or similar term inadvertently appear in the Contract Documents it is to be replaced with "or approved," which requires a submittal for review and approval of the proposed product by the Architect.

- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product only during the bid period and when the Contractor confirms in writing that the following conditions are satisfied, or when a specified product is no longer available. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect and specific features and requirements indicated.
 3. Evidence that proposed product provides specified warranty.
 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 5. Samples, if requested.
- B. A request constitutes a representation that the Contractor:
1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
 2. Will coordinate installation and make changes to other work that may be required for the work to be complete with no additional cost to Owner.
 3. Waives claims for additional costs or time extension that may subsequently become apparent.
 4. Will reimburse Owner for Architect's review or redesign services associated with re-approval by authorities.
- C. Comparable products will not be considered when they are indicated or implied in submittals. To the maximum extent possible, comparable products are to be reviewed and approved by the Architect prior to the submission of submittals.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 1. Construction layout.
 2. Field engineering.
 3. Installation of the Work.
 4. Cutting and patching.
 5. Coordination of Owner-installed products.
 6. Progress cleaning.
 7. Starting and adjusting.
 8. Protection of installed construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 1. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water-service piping; underground electrical services and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 2. Examine walls, floors and roofs for suitable conditions where products and systems are to be installed.
 - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move or relocate existing utility structures, utility poles, lines, services or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish limits on use of Project site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level and plumb, of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.

3. Coordinate installation of anchorages. Furnish setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 5. Proceed with patching after construction operations requiring cutting are complete.
- E. Patching: Patch construction by filling, repairing, refinishing, closing up and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.

3. Ceilings: Patch, repair or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- F. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

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SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for progress cleaning of Project site.
 - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications and record Product Data.
 - 4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Advise Owner of changeover in heat and other utilities.
 - 3. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 4. Complete startup and testing of systems and equipment.
 - 5. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 6. Instruct Owner's personnel in operation, adjustment and maintenance of products, equipment and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
 - 7. Terminate and remove temporary facilities from Project site, along with mockups, construction tools and similar elements.
 - 8. Complete final cleaning requirements, including touchup painting.
 - 9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 7 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion

after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
 1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (Contractor's punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A or similar form pre-approved by the Architect.
 1. Organize list of spaces in sequential order, starting with exterior areas first.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Page number.
 4. Submit list of incomplete items in one of the following formats:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. PDF electronic file. Architect will return annotated file.
 - c. Three paper copies. Architect will return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion:
 - a. Clean Project site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers and grills.
 - o. Clean ducts, blowers and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - p. Clean light fixtures, lamps, globes and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.

- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired.

Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 1. Emergency manuals.
 2. Operation manuals for systems, subsystems and equipment.
 3. Maintenance manuals.

1.3 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in one of the following format:
 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- C. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem and equipment. If possible, assemble instructions for subsystems, equipment and components of one system into a single binder.
- D. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
 1. Binders: Heavy-duty, three-ring, vinyl-covered binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents. Indicate volume number for multiple-volume sets.
 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in

manual, insert typewritten pages indicating drawing titles, descriptions of contents and drawing locations.

2.2 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Gas leak.
 - 2. Water leak.
 - 3. Power failure.
 - 4. System, subsystem or equipment failure.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.

4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.

- E. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem and piece of equipment not part of a system.
 - 1. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints, as described under Part 2 of this Section.
- B. Record Specifications: Submit Project's Specifications, including addenda and contract modifications, as described under Part 2 of this Section.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or not indicated on the original Drawings.
 6. Note Construction Change Directive numbers, ASI numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding and submitting.
- C. Format: Identify and date each record Drawing; include the designation "AS-BUILT DRAWING DATE XX/XX/XXXX" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Scanned or electronically printed into PDF format.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials and equipment furnished, including substitutions and product options selected.

- B. Format: Submit record Specifications as paper copy and annotated PDF electronic file or scanned PDF electronic file(s) of marked-up paper copy of Specifications. Include the designation "AS-BUILT DRAWING DATE XX/XX/XXXX" in a prominent location.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

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SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including training in operation and maintenance of systems, subsystems and equipment.

1.3 QUALITY ASSURANCE

- A. Instructor Qualifications: A factory-authorized service representative experienced in operation and maintenance procedures and training.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Training: Include a description of specific skills and knowledge that participant is expected to master. Include instruction for the following as applicable to the system, equipment or component:
 - 1. Basis of System Design, Operational Requirements and Criteria: Include the following:
 - a. System, subsystem and equipment descriptions.
 - b. Operating standards.
 - c. Regulatory requirements.
 - d. Equipment function.

- e. Operating characteristics.
 - f. Limiting conditions.
 - g. Performance curves.
2. Documentation: Review the following items in detail:
- a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Warranties.
 - f. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
- a. Instructions on meaning of warnings, trouble indications and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
 - n. Economy and efficiency adjustments.
5. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.
6. Maintenance: Include the following:
- a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
7. Repairs: Include the following:
- a. Diagnosis instructions.

- b. Repair instructions.
- c. Disassembly; component removal, repair and replacement; and reassembly instructions.
- d. Instructions for identifying parts and components.
- e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction. Assemble training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate and maintain systems, subsystems and equipment not part of a system.
 - 1. Owner will furnish Contractor with names and positions of participants.
- B. Scheduling: Provide instruction at mutually agreed on times.
 - 1. Schedule training with Owner with at least seven days' advance notice.
- C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

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DIVISION 02 – EXISTING CONDITIONS

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SECTION 024116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of buildings.
2. Removing below-grade construction.
3. Salvaging items for reuse.

B. Related Requirements:

1. Section 011000 "Summary" for use of the premises and phasing requirements.
2. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before building demolition.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

1.3 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.4 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be demolished.
2. Review structural load limitations of existing structures.
3. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review and finalize protection requirements.
5. Review procedures for dust control.

6. Review procedures for protection of adjacent buildings.
7. Review items to be salvaged and returned to Owner.

1.5 INFORMATIONAL SUBMITTALS

- A. Schedule of Building Demolition Activities: Indicate the following:
 1. Detailed sequence of demolition work, with starting and ending dates for each activity.
- B. Predemolition Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by salvage and demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.7 FIELD CONDITIONS

- A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. On-site storage or sale of removed items or materials is not permitted.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSP A10.6 and NFPA 241.

2.2 SOIL MATERIALS

- A. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

- A. Salvaged Items: Comply with the following:
 - 1. Clean salvaged items of dirt and demolition debris.
 - 2. Store items in a secure area until reuse.
 - 3. Protect items from damage during storage.

3.3 DEMOLITION, GENERAL

- A. General: Demolish indicated buildings completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads and other adjacent occupied and used facilities.
 - 1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed trafficways if required by authorities having jurisdiction.
 - 2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
- C. Explosives: Use of explosives is not permitted.

3.4 DEMOLITION BY MECHANICAL MEANS

- A. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
- B. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 1. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

- C. Salvage: Items to be removed and salvaged are indicated below:
 - 1. Wide planks (wall and roof sheathing) for paneling.
 - 2. 4x6 lumber (columns) for collar ties.
- D. Salvage: balance of wood materials to be set aside for Owner's review of re-use or storage.
- E. Below-Grade Construction: Demolish foundation walls and other below-grade construction.
 - 1. Remove below-grade construction, including foundation walls, and footings, completely.

3.5 SITE RESTORATION

- A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
- B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove Owner reviewed demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
 - 1. Do not allow demolished materials to accumulate on-site, unless approved by Owner.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - 1. Clean roadways of debris caused by debris transport.

END OF SECTION 024116

DIVISION 03 – CONCRETE

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
- C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.

2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Vapor retarders.
10. Semirigid joint filler.
11. Joint-filler strips.
12. Repair materials.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates

C. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, **acceptable to authorities having jurisdiction**, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- B. Hot-Weather Placement: Comply with ACI 301.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- B. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

2.4 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type II.

B. Normal-Weight Aggregates: ASTM C 33/C 33M **Class 3M** coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: **3/4 inch**.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Air-Entraining Admixture: ASTM C 260/C 260M.

D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.6 VAPOR RETARDERS

A. Sheet vapor retarder: ASTM E 1745, class A, except with maximum water-vapor permeance of less than 0.01 perms [grains/ft²/hr/in-hg] as per ASTM E 96 or ASTM F 1249 for both new material (ASTM E 154 section 7) and material subjected to conditioning testing as outlined in ASTM E 154 sections 8, 11, 12, and 13. It should be installed with seams lapped 6 inches according to ASTM E 1643. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Reef Industries, Inc.
 - b. Stego Industries, LLC.
 - c. W. R. Meadows, Inc.

2.7 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. [ChemMasters, Inc.](#)
 - b. [Curecrete Distribution Inc.](#)
 - c. [PROSOCO, Inc.](#)
 - d. [Vexcon Chemicals Inc.](#)
 - e. [W. R. Meadows, Inc.](#)

2.8 CURING MATERIALS

- A. Water: Potable.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than **4100 psi** at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use **plasticizing** admixture in concrete, as required, for placement and workability.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. As specified on the drawings for each member type.

2.12 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. **Class A, 1/8 inch.**
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. **Do not chamfer** exterior corners and edges of permanently exposed concrete.

- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.

3.3 REMOVING AND REUSING FORMS

- A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.
- B. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-RETARDER INSTALLATION

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
- B. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.5 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view.
 - 2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - 3. Finish and measure surface, so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed **[1/4 inch] [3/16 inch] [1/8 inch]**.

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

3.12 LIQUID FLOOR TREATMENT APPLICATION

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than 14 days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least **one** month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections: As specified on the drawings
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure **two** sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 within **24** hours of finishing.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

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DIVISION 05 – METALS

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SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal ladders.
 - 2. Miscellaneous steel items.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 - 1. Metal ladders.
 - 2. Miscellaneous steel items.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names or blemishes.
- B. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.

2.2 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

2.3 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
 - 2. Provide primers that comply with Section 099113 "Exterior Painting."

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.

- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Cut, reinforce, drill and tap metal fabrications as indicated to receive finish hardware, screws and similar items.
- H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes and profiles indicated and as necessary to receive adjacent construction.
- C. Prime miscellaneous framing and supports.

2.6 METAL LADDERS

- A. General: Comply with ANSI A14.
- B. Steel Ladders:
 - 1. Space siderails 24" apart unless otherwise indicated.
 - 2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
 - 3. Rungs: 1-inch-diameter steel bars.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by coating with abrasive material metallically bonded to rung.
 - 6. Support each ladder at top and bottom and not more than 60 inches on center with welded or bolted steel brackets.
 - 7. Prime ladders, including brackets and fasteners, ready for field painting.

2.7 MISCELLANEOUS STEEL ITEMS

- A. Unless otherwise indicated, fabricate units from steel shapes, plates and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings and anchorages as needed to coordinate assembly and installation with other work.
- C. Prime miscellaneous steel items, ready for field painting.

2.8 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 STEEL AND IRON FINISHES

- A. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean fabrications of grease, dirt, oil, flux and other foreign matter, and treat with metallic phosphate process.
- B. Shop prime iron and steel items unless they are to be embedded in concrete, or unless otherwise indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment and elevation; with edges and surfaces level, plumb, true and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws and other connectors.

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry or similar construction.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 055000

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DIVISION 06 – WOOD AND PLASTICS

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SECTION 061000 - ROUGH CARPENTRY

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. Framing with dimension lumber.
- 2. Framing with timber.
- 3. Framing with engineered wood products.

- B. Related Requirements:

- 1. Section 061600 "Sheathing" for sheathing.
- 2. Section 061753 "Shop-Fabricated Wood Trusses" for wood trusses made from dimension lumber.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal (38 mm actual) size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) size or greater but less than 5 inches nominal (114 mm actual) size in least dimension.
- C. Exposed Framing: Framing not concealed by other construction.
- D. OSB: Oriented strand board.
- E. Timber: Lumber of 5 inches nominal (114 mm actual) size or greater in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Post-installed anchors.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent.
- C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWPA U1 category UC4a for items in contact with ground.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Treatment shall not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: No. 2 grade.
 - 1. Application: Interior partitions not indicated as load bearing.
 - 2. Species: Western woods; WCLIB or WWPA.
- B. Structural Framing: As indicated on the drawings.

2.5 TIMBER FRAMING

- A. Comply with the following requirements, according to grading rules of grading agency indicated:

1. Species and Grade: As indicated on the drawings.
2. Maximum Moisture Content: 20 percent.
3. Additional Restriction: Free of heart centers.

2.6 ENGINEERED WOOD PRODUCTS

- A. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- B. Material Specifications: As indicated on the drawings

2.7 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Cants.
 5. Furring.
 6. Grounds.
 7. Utility shelving.

2.8 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Post-Installed Anchors: As indicated on the drawings.

2.9 METAL FRAMING ANCHORS

- A. As indicated on the drawings.

2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
- I. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. ICC-ES evaluation report for fastener.

- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600 - SHEATHING

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. Wall sheathing.
2. Roof sheathing.

- B. Related Requirements:

1. Section 061000 "Rough Carpentry."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
2. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
3. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
4. For Zip sheathing, provide information indicating compliance with ICCES AC269 and ICC-ES AC310.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Fire-retardant-treated plywood.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- B. For Zip sheathing:
 - 1. Air-Barrier Assembly Air Leakage: Less than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.2 L/s x sq. m at 75 Pa), per ASTM E2375.
 - 2. Water-Vapor Permeance, Facer: Minimum 12 perms (689 ng/Pa x s x sq. m), ASTM E96/E96M.
 - 3. Weather Exposure: Manufacturer warranty applies for maximum allowable exposure period of 180 days.

2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-

test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F (76 deg C) shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

2.4 WALL SHEATHING

- A. Plywood Sheathing: As indicated on the drawings.
- B. Oriented-Strand-Board Sheathing: As indicated on the drawings.
- C. Zip Sheathing:
 - 1. Basis-of-Design Product: Provide Huber Engineered Woods LLC; ZIP System R Sheathing.
 - 2. Span Rating and Performance Category of Sheathing Layer: Not less than 24/16; 7/16 Performance Category.
 - 3. Thickness: 1 inch.
 - 4. Thermal Resistivity (R Value): 3.6 deg F x h x sq. ft./Btu x in. at 75 deg F .
 - 5. Edge Profile: Square edge.
 - 6. Exterior Facer: Medium-density, phenolic-impregnated polymer-modified sheet material meeting requirements for ASTM D779 Grade D weather-resistive barrier in accordance with ICC AC38 and AC310, with fastener spacing symbols on exterior facer for 16-inch and 24-inch on center spacing, with the following characteristics
 - 7. Water Resistance of Coatings, ASTM D2247: Pass 14 day exposure test.
 - 8. Moisture Vapor Transmission, ASTM E96: Not less than 12 perms.
 - 9. Water Penetration, ASTM E331: Pass at 2.86 lbf/sq. ft. .
 - 10. Wind Driven Rain, TAS-100: Pass.

11. Accelerated Weathering, ASTM G154: Pass.

2.5 ROOF SHEATHING

- A. Plywood Sheathing: As indicated on the drawings.
- B. Oriented-Strand-Board Sheathing: As indicated on the drawings.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Screws for Fastening Sheathing to Wood Framing: ASTM C 1002.
- E. Nails, Brads, and Staples for fastening Zip sheathing: ICC AC116 and ICC AC201.

2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. For Zip sheathing, Self-Adhering Seam and Flashing Tape: Pressure-sensitive, self-adhering, cold-applied, seam tape consisting of polyolefin film with acrylic adhesive, meeting ICC AC148. Basis-of-Design Product: Provide Huber Engineered Woods; ZIP System Tape.
 - 1. Thickness: 0.012 inch (0.3 mm).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in the ICC's International Residential Code for One- and Two-Family Dwellings.

3. ICC-ES evaluation report for fastener.
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
 - E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
 - F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
 - G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.
 - H. Install sheathing panels in accordance with manufacturer's written instructions, requirements of applicable Evaluation Reports, and requirements of authorities having jurisdiction.

END OF SECTION 061600

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SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood roof trusses.

1.3 DEFINITIONS

- A. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
- B. Shop Drawings: Show fabrication and installation details for trusses.
 - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - 2. Indicate sizes, stress grades, and species of lumber.
 - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
 - 5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - 6. Show splice details and bearing details.
- C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.

2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction and is certified for chain of custody by an FSC-accredited certification body.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."
1. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 2. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 3. Provide for air circulation around stacks and under coverings.
- B. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
1. Design Loads: As indicated.
 2. Maximum Deflection under Design Loads: Per the ICC IBC version enforced by the jurisdiction at the time of construction.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S.
3. Provide dry lumber with 19 percent maximum moisture content at time of dressing.

B. Minimum Specific Gravity for Top Chords: 0.50.

C. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

A. General: Fabricate connector plates to comply with TPI 1.

B. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

2.4 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.

B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

A. As indicated on the drawings.

2.6 FABRICATION

A. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.

B. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.

C. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.

1. Fabricate wood trusses within manufacturing tolerances in TPI 1.

D. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

2.7 SOURCE QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections.
 - 1. Provide special inspector with access to fabricator's documentation of detailed fabrication and quality-control procedures that provide a basis for inspection control of the workmanship and the fabricator's ability to conform to approved construction documents and referenced standards.
 - 2. Provide special inspector with access to places where wood trusses are being fabricated to perform inspections.
- B. Correct deficiencies in Work that special inspections indicate do not comply with the Contract Documents.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
- F. Space trusses as indicated; adjust and align trusses in location before permanently fastening.
- G. Anchor trusses securely at bearing points; use metal truss tie-downs as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- H. Securely connect each truss ply required for forming built-up girder trusses.
 - 1. Anchor trusses to girder trusses as indicated.
- I. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
 - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- J. Install wood trusses within installation tolerances in TPI 1.
- K. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

- L. Replace wood trusses that are damaged or do not comply with requirements.
 - 1. Damaged trusses may be repaired according to truss repair details signed and sealed by the qualified professional engineer responsible for truss design, when approved by Architect.

3.2 REPAIRS AND PROTECTION

- A. Protect wood trusses from weather. If, despite protection, wood trusses become wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061753

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SECTION 062013 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Exterior trim.
 - 2. Engineered wood siding.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturer's warranties.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.

1.5 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.6 WARRANTY

- A. Engineered Wood Manufacturer's Warranty: Manufacturer agrees to repair or replace components of engineered wood siding and trim that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
 - 2. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
 - 3. Warranty Period: Siding and Trim (Excluding Finish), 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ENGINEERED WOOD SIDING

- A. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - 1. James Hardie Building Products, Inc., "Select Cedarmill."
- B. Engineered Wood Siding: ANSI A135.6, primed with manufacturer's standard exterior primer.
 - 1. Type:
 - a. 5/16-inch-thick, square-edge flat panels; without grooves, 120 inches by 48 inches.
 - 2. Texture: Wood grain.
- C. Colors, Textures, and Patterns: Primed.

2.2 ENGINEERED WOOD BATTEN BOARDS

- A. **Manufacturers:** Subject to compliance with requirements, provide products by the following:
 - 1. James Hardie Building Products, Inc., "Rustic Grain."
- B. Engineered Wood Siding: ANSI A135.6, primed with manufacturer's standard exterior primer.
 - 1. Type:
 - a. 3/4-inch-thick, 2-1/2 inches wide.
 - 2. Texture: Wood grain.
- C. Colors, Textures, and Patterns: Primed.

2.3 ENGINEERED WOOD TRIM

- A. **Manufacturers:** Subject to compliance with requirements, provide products by the following:

1. James Hardie Building Products, Inc., "5/4 Rustic."
- B. Engineered Wood Siding: ANSI A135.6, primed with manufacturer's standard exterior primer.
 1. Type:
 - a. 1-inch-thick, 5-1/2 inches wide.
 2. Texture: Wood grain.
- C. Colors, Textures, and Patterns: Primed.

2.4 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
 1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails.
- B. Flashing: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.
 1. Horizontal Joint Flashing for Panel Siding: Preformed, prefinished-aluminum, Z-shaped flashing.
- C. Sealants: Latex, complying with ASTM C834 Type OP, Grade NF and applicable requirements in Section 079200 "Joint Sealants," and recommended by sealant and substrate manufacturers for intended application.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Pecora Corporation.
 - b. Tremco Incorporated.

2.5 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches, except members with ends exposed in finished work.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut exterior finish carpentry to fit adjoining work.
 - 3. Refinish and seal cuts as recommended by manufacturer.
 - 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
 - 5. Coordinate exterior finish carpentry with materials and systems in or adjacent to it.
 - 6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 INSTALLATION OF STANDING AND RUNNING TRIM

- A. Install flat-grain lumber with bark side exposed to weather.
- B. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.
 - 1. Use scarf joints for end-to-end joints.
 - 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water.
 - 1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
 - 2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 INSTALLATION OF SIDING

- A. Install siding to comply with manufacturer's written instructions and warranty requirements.
- B. Engineered Wood Siding:
 - 1. Install engineered wood siding to comply with manufacturer's written instructions.
 - 2. Install panels with edges over framing or blocking.
 - 3. Leave 3/16-inch gap at perimeter, openings, and horizontal panel joints unless otherwise recommended by panel manufacturer.
 - 4. Seal butt joints at inside and outside corners and at trim locations.
 - 5. Install continuous metal flashing at horizontal panel joints.
 - 6. Apply battens and corner trim as indicated.
 - 7. Conceal fasteners to greatest practical extent by placing in grooves of siding pattern or by concealing with applied trim or battens as detailed.
- C. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.
- D. Finish: Apply finish within two weeks of installation.

3.6 ADJUSTING

- A. Replace exterior finish carpentry that is damaged or does not comply with requirements.
 - 1. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean exterior finish carpentry on exposed and semiexposed surfaces.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062013

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

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. Plastic-laminate-faced architectural cabinets.
- 2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

- B. Related Requirements:

- 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
- 2. Section 123653 "Laboratory Worksurfaces."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products high-pressure decorative laminate, adhesive for bonding plastic laminate and cabinet hardware and accessories.

- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

- 1. Show details full size.
- 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

- C. Samples for Initial Selection:

- 1. Plastic laminates.
- 2. PVC edge material.

- D. Samples for Verification:

- 1. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.

2. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For the following:
 1. High-pressure decorative laminate.
 2. Adhesives.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that cabinets can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087111 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS **PL-1**

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
- B. Grade: Custom.
- C. Type of Construction: Frameless.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Formica
- F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Product: #9484-NG "Oxidized Beamwood"
 - 2. Finish: Natural Grain.
- G. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Vertical Surfaces: Grade HGS.
 - 3. Edges: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
 - 4. Pattern Direction: **Vertical Grain** for drawer fronts, doors, and fixed panels.
- H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
 2. Particleboard: ANSI A208.1, Grade M-2.
 3. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087111 "Door Hardware (Descriptive Specification)."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch in diameter.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- F. Drawer Slides: BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted; full-extension type; zinc-plated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 4. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
- G. Door and Drawer Silencers: BHMA A156.16, L03011.

- H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 - 2. Satin Stainless Steel: BHMA 630.
- I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION

- A. Fabricate cabinets to dimensions, profiles, and details indicated.
- B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
- B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk and concealed fasteners.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

DIVISION 07 – THERMAL AND MOISTURE PROTECTION

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SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Plant-based blanket insulation.
- B. Related Requirements:
 - 1. Section 061600 "Sheathing" for insulated sheathing panels.
 - 2. Section 072119 "Foamed-in-Place Insulation" for spray-applied polyurethane foam insulation.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Plant-based blanket insulation.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal-Resistance Value (R-Value): R-value as indicated below in accordance with ASTM C518.
 - 1. R-Value:
 - a. Basis: R-3.69 per inch
 - b. 2 inches R-7.
 - c. 5.5 inches R-20.

2.2 PLANT-BASED BLANKET INSULATION

- A. Plant-Based Blanket Insulation, Unfaced: ASTM C665, Type I; ASTM E84 Class “A” combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Hempitecture, “Hempwool.”

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Blanket Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

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SECTION 072119 - FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam insulation.
2. Accessories.

B. Related Requirements:

1. Section 072100 "Thermal Insulation" for additional cavity insulation.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Closed-cell spray polyurethane foam insulation.
2. Accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by qualified testing agency.
- B. Research Reports: For spray-applied polyurethane foam-plastic insulation, from ICC-ES.
- C. Qualification Statements: For Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 1.5 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Carlisle Spray Foam Insulation.
 - b. Johns Manville; a Berkshire Hathaway company.
2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
3. Fire Propagation Characteristics: Passes NFPA 285 and NFPA 276 testing as part of an approved assembly.

2.2 ACCESSORIES

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- E. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect spray foam insulation installation, including accessories. Report results in writing.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119

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SECTION 072600 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforced-polyethylene vapor retarders.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for under-slab vapor retarders.

1.2 ACTION SUBMITTALS

- A. Product Data:
 - 1. Reinforced-polyethylene vapor retarders.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 REINFORCED-POLYETHYLENE VAPOR RETARDERS

- A. Reinforced-Polyethylene Vapor Retarders: Sheet with outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 20 lb/1000 sq. ft., with maximum permeance rating of 0.1 perm.
 - 1. <Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Reef Industries, Inc.
 - b. Viaflex.

2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.2 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Place vapor retarders on side of construction indicated on Drawings.
- B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
- D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.3 PROTECTION

- A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 072600

SECTION 074113.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Standing-seam metal roof panels.
- B. Related Requirements:
 - 1. Section 260519 "Electrical Power Conductors & Cables" for roof mounted solar cells.

1.2 ACTION SUBMITTALS

- A. Product Data: For standing-seam metal roof panels. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For standing-seam metal roof panels, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.8 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.

- b. Deterioration of metals and other materials beyond normal weathering.
- 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 40 years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads:
 - a. Zone 1 (roof field area): 21 psf.
 - b. Zone 2 (roof area perimeter): 24 psf.
 - c. Zone 3 (roof area corners): 24 psf.
 - 2. Other Design Loads: Solar Cells, 3 psf.
 - 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: UL 90.

- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.

1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.
2. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.

- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and a flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Basis-of-Design Product: Subject to compliance with requirements, provide AEP Span a brand of ASC Profiles LLC, a part of BlueScope; SpanSeam or a comparable product by one of the following:
 - a. ATAS International, Inc.
 - b. Berridge Manufacturing Company.
 - c. CENTRIA, a Nucor Brand.
2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, G90 coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A792/A792M, Class AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: 0.034 inch.
 - b. Exterior Finish: Two-coat fluoropolymer.
 - c. Color: Match AEP Span “Cool Midnight Bronze.”
3. Clips: One-piece fixed to accommodate thermal movement.
 - a. 0.064-inch- nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
4. Joint Type: As standard with manufacturer.
5. Panel Coverage: 16 inches.
6. Panel Height: 2.0 inches.

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 mils thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
 - 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
 - 3. Basis-of-Design Product: Subject to compliance with requirements, provide AEP Span a brand of ASC Profiles LLC, a part of BlueScope; Underlayment HT or comparable product by one of the following:
 - a. ATAS International, Inc.
 - b. Carlisle WIP Products; a brand of Carlisle Construction Materials.
 - c. Henry Company; a Carlisle company.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 SOLAR PANEL MOUNTING CLIPS

- A. Seam mounted panel clips for solar panel installation.
 - 1. Product: S-5! "PVKIT 2.0" mid- and edge-mounting conditions.
 - 2. Attachment color: Black

2.5 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

- D. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 - 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.6 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.7 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Steel Panels and Accessories:
 - 1. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions[**for seacoast and severe environments**].
 - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 076200 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING-SEAM METAL ROOF PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
 - 2. Stainless Steel Panels: Use stainless steel fasteners.
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended in writing by manufacturer.

1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074113.16

SECTION 076200 - SHEET METAL FLASHING AND TRIM

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. Formed steep-slope roof sheet metal fabrications.
 - 2. Formed wall sheet metal fabrications.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: For sheet metal flashing and trim.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 - 4. Include details for forming, including profiles, shapes, seams, and dimensions.
 - 5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 6. Include details of termination points and assemblies.

7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches x12 inches.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 1. Surface: Smooth, flat.
 2. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 3. Color: Match AEP Span "Cool Midnight Bronze" at roof, roof perimeter and at head wall flashing, galvanized at balance.

4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.

2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- F. Do not use graphite pencils to mark metal surfaces.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Drip Edges: Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.
 2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
- B. Rake and Ridge Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.
 2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
- C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.
 2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.
- D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch thick.
 2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

2.6 WALL SHEET METAL FABRICATIONS

- A. Opening and Wall Bottom Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
 - 1. Galvanized Steel: 0.022 inch thick.
 - 2. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 4. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- G. Rivets: Rivet joints in zinc where necessary for strength.

3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, and similar flashings to extend 4 inches beyond wall openings.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. [3M Fire Protection Products.](#)
 - b. [Tremco, Inc.](#)
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- D. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

- B. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- C. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- D. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "**FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS**," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 - 1. Locate in accessible floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.

3.5 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.6 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing:
 - 1. UL-Classified Systems: W-L- 1001.
 - 2. F-Rating: 1 hour.
- C. Penetration Firestopping Systems for Electrical Cables:

1. UL-Classified Systems: W-L- 1017.
2. F-Rating: 1 hour.

END OF SECTION 078413

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Sample Warranties: For special warranties.

1.5 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

- a. [Pecora Corporation.](#)
- b. [Tremco Incorporated.](#)

2.3 URETHANE JOINT SEALANTS

- A. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. [LymTal International Inc.](#)

2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. [Pecora Corporation.](#)
 - b. [Tremco Incorporated.](#)

2.5 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. [BASF Corporation-Construction Systems.](#)
 - b. [Construction Foam Products; a division of Nomaco, Inc.](#)
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Backer Strips for Cold- Applied Joint Sealants (Exterior concrete joints): ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.6 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. **Isolation and contraction joints in cast-in-place concrete slabs.**
 - 2. Joint Sealant: Urethane, M, P, 50, T, NT.
 - 3. Joint-Sealant Color: Match Lyntal "Concrete Gray."
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. **Joints at cementitious siding.**
 - b. Perimeter joints between materials listed above and frames of doors, windows and louvers.
 - 2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.
 - 3. Joint-Sealant Color: Match Tremco "Bronze."
- C. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
 - 1. Joint Locations:
 - a. **Perimeter joints between interior wall surfaces and frames of interior doors and windows.**
 - 2. Joint Sealant: Acrylic latex.
 - 3. Joint-Sealant Color: Tremco "White" paintable.

END OF SECTION 079200

DIVISION 08 – OPENINGS

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Interior standard steel doors and frames.
 - 2. Exterior standard steel doors and frames.
- B. Related Requirements:
 - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings in accordance with NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.3 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of anchorages, joints, field splices, and connections.
 - 7. Details of accessories.
 - 8. Details of moldings, removable stops, and glazing.

- C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly and thermally rated door assemblies for tests performed by a qualified testing agency indicating compliance with performance requirements.

1.6 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ceco Door; AADG, Inc.; ASSA ABLOY.
 2. Curries, AADG, Inc.; ASSA ABLOY Group.
 3. Steelcraft; Allegion plc.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
- B. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested in accordance with ASTM C1363 or ASTM E1423.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule.
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Core: Manufacturer's standard.
 - f. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.
 - 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
 - b. Sidelite Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Face welded.
 - 3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule.
 - 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, with minimum A40 coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - f. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - g. Core: Polystyrene, Polyurethane or Polyisocyanurate.
 - 2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
 - b. Construction: Face welded.
3. Exposed Finish: Prime.

2.5 FRAME ANCHORS

- A. Jamb Anchors:
1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized in accordance with ASTM A153/A153M, Class B.

2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized in accordance with ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.7 FABRICATION

- A. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Sidelite Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- B. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping in accordance with ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
- C. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.
 - 1. Provide stops and moldings flush with face of door, and with square stops unless otherwise indicated.
 - 2. Provide fixed frame moldings on on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 - 3. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 - 4. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11 or NAAMM-HMMA 840 as required by standards provided.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames in accordance with NFPA 80.
 - 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 4. Solidly pack mineral-fiber insulation inside frames.
 - 5. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 - 1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8 or NAAMM-HMMA 841 and NAAMM-HMMA guide specification indicated.

2. Fire-Rated Doors: Install doors with clearances in accordance with NFPA 80.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 REPAIR

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

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SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Access doors and frames.
 2. Fire-rated access doors and frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details material descriptions, dimensions of individual components and profiles, and finishes.

1.3 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Babcock-Davis.
 - b. Karp Associates, Inc.
 - c. Nystrom, Inc.
 2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
 3. Locations: Ceiling.
 4. Door Size: 24 inch by 24 inch.
 5. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage factory primed.
 6. Frame Material: Same material and thickness as door.
 7. Latch and Lock: Cam latch, screwdriver operated.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- C. Frame Anchors: Same material as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
 - 2. For concealed flanges with plaster bead for full-bed plaster applications, provide zinc-coated expanded-metal lath and exposed casing bead welded to perimeter of frames.
- D. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113

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SECTION 083613 - SECTIONAL DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sectional-door assemblies.
- B. Related Requirements:
 - 1. Section 099113 "Exterior Painting" for finish painting of factory-painted steel doors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
- B. Shop Drawings: For each installation and for components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties: For manufacturer's warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sectional doors to include in maintenance manuals.
- B. Manufacturer's warranty.

- C. Finish warranty.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Failure of components or operators before reaching required number of operation cycles.
 - c. Faulty operation of hardware.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - e. Delamination of exterior or interior facing materials.
2. Warranty Period: Ten years from date of Substantial Completion for delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain sectional doors from single source from single manufacturer.
 1. Obtain operators from sectional door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 1. Design Wind Load: As indicated on Drawings.
 2. Testing: In accordance with ASTM E330/E330M or DASMA 108 for garage doors and complying with DASMA 108 acceptance criteria.
 3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.

- a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of door width.
 - b. Deflection of horizontal track assembly shall not exceed 1/240 of door height.
- C. Seismic Performance: Provide sectional doors that withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
- 1. Component Importance Factor: 1.0.

2.3 SECTIONAL-DOOR ASSEMBLY

- A. Steel Sectional Door: Provide sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.
- 1. **Basis-of-Design Product:** Subject to compliance with requirements, provide **Overhead Door Corporation Model 596** or comparable product by one of the following:
 - a. Amarr; an ASSA ABLOY Group company.
 - b. Wayne Dalton; a division of Overhead Door Corporation.
- B. Operation Cycles: Door components and operators capable of operating for not less than 25,000 operation cycles. One operation cycle is complete when door is opened from closed position to the open position and returned to closed position.
- C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. when tested in accordance with ASTM E283 or DASMA 105.
- D. U-Value: 0.100 Btu/sq. ft. x h x deg F.
- E. Steel Door Sections: ASTM A653/A653M, zinc-coated (galvanized), cold-rolled, commercial steel sheet with G60 zinc coating.
- 1. Door-Section Thickness: 2 inches.
 - 2. Section Faces:
 - a. Thermal-Break Construction: Provide sections with continuous thermal-break construction separating the exterior and interior faces of door.
 - b. Exterior Face: Fabricated from single sheets, not more than 24 inches high; with horizontal meeting edges rolled to continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove, weather- and pinch-resistant seals and reinforcing flange return.
 - 1) Steel Sheet Thickness: 0.040-inch nominal coated thickness.
 - 2) Surface: Manufacturer's standard, flat, textured.
 - c. Interior Face: Enclose insulation completely within steel exterior facing and interior facing material, with no exposed insulation. Provide the following interior-facing material:

- 1) Zinc-Coated (Galvanized) Steel Sheet: With minimum nominal coated thickness of 0.028 inch.
3. End Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch nominal coated thickness and welded to door section.
4. Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free insulation of type indicated below:
 - a. Foamed-in-Place Insulation: Polyurethane, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load.
- F. Track: Manufacturer's standard, galvanized-steel, vertical-lift track system. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides.
 1. Material: Galvanized steel, ASTM A653/A653M, minimum G60 zinc coating.
 2. Size: As recommended in writing by manufacturer for door size, weight, track configuration and door clearances indicated on Drawings.
 3. Track Reinforcement and Supports: Provide galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches apart for door-drop safety device.
 - a. Vertical Track: Incline vertical track to ensure weathertight closure at jambs. Provide intermittent jamb brackets attached to track and wall.
- G. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom top and jambs of door.
- H. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.
 1. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch nominal coated thickness at each end stile and at each intermediate stile, in accordance with manufacturer's written recommendations for door size.
 - a. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.
 2. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Match roller-tire diameter to track width.
 - a. Roller-Tire Material: Manufacturer's standard.
- I. Locking Device:
 1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.

2. Chain Lock Keeper: Suitable for padlock.
- J. Counterbalance Mechanism:
1. Torsion Spring: Adjustable-tension torsion springs complying with requirements of DASMA 102 for number of operation cycles indicated, mounted on torsion shaft.
 2. Cable Drums and Shaft for Doors: Cast-aluminum cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised.
 - a. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft.
 - b. Provide one additional midpoint bracket for shafts up to 16 ft. long.
 3. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
- K. Manual Door Operator:
1. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25 lbf force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.
- L. Metal Finish: Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
1. Baked-Enamel: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
 - a. Color and Gloss: White, factory gloss.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions.
- B. Tracks:
 1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches apart.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- D. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 083613

SECTION 085113 - ALUMINUM WINDOWS

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 aluminum windows for exterior locations.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: For aluminum windows.
 - 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 - 2. Warranty Period:
 - a. Window: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/IS.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: AAMA certified with label attached to each window.
- B. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.

2.3 ALUMINUM WINDOWS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Milgard Manufacturing, Inc.; A250 Thermally Improved Aluminum windows or a comparable product by one of the following:
 - 1. Arcadia Inc., T225 Series

- B. Types: Provide the following types in locations indicated on Drawings:
1. Casement: Outswing.
 2. Fixed.
- C. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- D. Insulating-Glass Units: ASTM E2190.
1. Glass: ASTM C1036, Type 1, Class 1, q3.
 - a. Tint: Gray.
 2. Lites: Two.
 3. Filling: Fill space between glass lites with argon.
 4. Low-E Coating: Pyrolytic on second surface.
- E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- F. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
1. Exposed Hardware Color and Finish: As indicated by manufacturer's designations.
- G. Casement Window Hardware:
1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
 - a. Type and Style: Manufacturer's standard.
 2. Hinges: Non-friction type, not less than two per sash.
 3. Lock: Lift-type throw, cam-action lock with keeper.
- H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - 1. Type and Location: Full, inside for outswing sashes.
- B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
 - 1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.
- C. Glass-Fiber Mesh Fabric: 18-by-14 or 18-by-16 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656/D3656M.
 - 1. Mesh Color: Manufacturer's standard.

2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.

B. Related Requirements:

1. Section 064116 "Plastic-Laminate-Clad Architectural Cabinets" for cabinet door hardware provided with cabinets.
2. Section 081113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow-metal frames.
3. Section 083113 "Access Doors and Frames" for access door hardware, including cylinders.
4. Section 083613 "Sectional Doors" for door hardware provided as part of sectional door assemblies.

1.2 COORDINATION

- A. 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.
- B. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.

2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
 3. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d. Fastenings and other installation information.
 - e. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
 - f. Mounting locations for door hardware.
 - g. List of related door devices specified in other Sections for each door and frame.
- C. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and Architectural Hardware Consultant.
- B. Product Certificates: For each type of electrified door hardware.
 1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
- C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
- D. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.

- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- A. Deliver permanent keys direct from factory by registered mail or overnight package service to: **Key Shop Access Coordinator at Facilities, University of Idaho.**

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:
 - a. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
 - 1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
- B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 - 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Ives, an Allegion Company**, or comparable product by one of the following:
 - a. STANLEY; dormakaba USA, Inc.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Lock Trim:
 - 1. Levers: Cast.
 - 2. Escutcheons (Roses): Wrought.
 - 3. Dummy Trim: Match lever lock trim and escutcheons.

- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schlage, an Allegion Company.

2.5 AUXILIARY LOCKS

- A. Push-Button Combination Locks: BHMA A156.25; cylindrical; Grade 1; UL 294; lock opens by entering a three- to six-digit code by pushing correct buttons in correct sequence; automatically relocks when door is closed; with strike that suits frame.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schlage, an Allegion Company; CO-100 Standalone Electronic Lock.

2.6 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Von Duprin, an Allegion Company.

2.7 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Schlage, an Allegion Company.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 2 permanent cores; face finished to match lockset.
 - 1. Core Type: Interchangeable.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.8 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.
 - 1. Master Key System: Change keys and a master key operate cylinders.
 - a. Provide three cylinder change keys and five master keys.
 - 2. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Nickel silver.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "**Prop. U of I – Do Not Dup.**"

2.9 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; bronze or stainless steel unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Ives, an Allegion Company.

2.10 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. LCN, an Allegion Company.

2.11 MECHANICAL STOPS AND HOLDERS

- A. Overhead Stops:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Glynn Johnson, an Allegion Company.

2.12 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. National Guard Products, Inc.
- B. Maximum Air Leakage: When tested in accordance with ASTM E283 with tested pressure differential of 0.3-inch wg, as follows:
 - 1. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.

2.13 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. National Guard Products, Inc.

2.14 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch-thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Ives, an Allegion Company**, or comparable product by one of the following:
 - a. Trimco.

2.15 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Ives, an Allegion Company.

2.16 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.

- B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Fire-Rated Applications:
 - a. Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 - 3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.17 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. 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 of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames in accordance with ANSI/SDI A250.6.

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.
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as directed by Owner.

- F. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- G. 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 will impede traffic.
- H. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- I. 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.

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 that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

3.7 DOOR HARDWARE SCHEDULE

Hardware Group	Qty.	Type	Manufacturer	Description	Finish
Group #1	1	Exit Device	Von Duprin	99	US26D/626
Entry	1	Mech Push Lock	DormaKaba	LP1000	US26D/626
101	1	Cylinder	Schlage	6-PIN	
	3	Hinges	Ives	5BB1HW NRP	US26D/626
	1	Door Closer	LCN	4040XP-3049CNS	689
	1	Overhead Drip	National Guard	16A	Mill
	1 set	Weatherstripping	National Guard	134S	Mill
	1	Door Shoe	National Guard	19V	Mill

	1	Threshold	National Guard	428E	Mill
<hr/>					
Group #2	1	Latchset	Schlage	ND50PD RHO F80	US26D/626
Office	1	Cylinder	Schlage	6-PIN	
102	3	Hinges	Ives	5BB1HW NRP	US26D/626
	1	Wall Stop	Ives	WS401	US26D/626
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Group #3	1	Latchset	Schlage	ND53PD RHO F109	US26D/626
Storage	1	Cylinder	Schlage	6-PIN	
104A	3	Hinges	Ives	5BB1HW NRP	US26D/626
	1	Overhead Stop	Glynn-Johnson	90F	652
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Group #4	1	Latchset	Schlage	ND80PD RHO F86	US26D/626
Utility 1HR	1	Cylinder	Schlage	6-PIN	US26D/626
105	3	Hinges	Ives	5BB1HW NRP	US26D/626
	1	Closer	LCN	4040XP-EDA	689

END OF SECTION 087100

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SECTION 088000 - GLAZING

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. Glass for doors, interior borrowed lites.
 - 2. Glazing sealants and accessories.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For glass.

- C. Sample Warranties: For special warranties.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Guardian Industries Corp.;
 2. Pilkington North America.
 3. PPG Industries, Inc.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: "Glazing Manual."
 - 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 - 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 - 1. Basis-of-Design Product:
 - a. [Pilkington North America Inc.](#); Optifloat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- D. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- E. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- F. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- G. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.

3.6 MONOLITHIC GLASS SCHEDULE

- A. Glass Type GL-1: Ultraclear fully tempered float glass (interior glazing).
 - 1. Minimum Thickness: 6 mm.
 - 2. Safety glazing labeling required.

END OF SECTION 088000

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DIVISION 09 – FINISHES

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SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Texture finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum board, Type X.
2. Joint treatment materials.
3. Textured finishes.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each type of gypsum panel and joint finishing material from single source with resources to provide products of consistent quality in appearance and physical properties.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.

2.3 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.4 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed; SAINT-GOBAIN.
 - b. Georgia-Pacific Gypsum LLC.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company.
 - d. USG Corporation.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered.

2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
 - 2. Shapes:
 - a. Cornerbead.
 - b. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - c. Expansion (control) joint.
 - d. Base-of-Wall Galvanized Moisture Barrier Trim: Galvanized-steel sheet, 2 inches high.
 - 1) Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a) VersaDry, LLC.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.

- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
- C. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."
- D. Vapor Retarder: As specified in Section 072600 "Vapor Retarders."

2.8 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Non-Aggregate Finish: Premixed, vinyl texture finish for spray application.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. CertainTeed; SAINT-GOBAIN.
 - b. ProForm Finishing Products, LLC provided by National Gypsum Company.
 - c. USG Corporation.
 - 2. Texture: Light Orange peel.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- G. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: As indicated on Drawings.
- B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. U-Bead: Use at exposed panel edges.

3.5 FINISHING OF GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

- a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 APPLICATION OF TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Resilient base.
 - 2. Resilient molding accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.3 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.

2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE **RB-1**

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Johnsonite: A Tarkett Company

- B. Product Standard: ASTM F1861, Type TS (rubber, vulcanized thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:
 - a. Style B, Cove: Provide in areas with concrete.
 - 1) Profile: TSB-XX "Baseworks"

- C. Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: 100' coiled lengths or 4' straight lengths.
- F. Outside Corners: Job formed or Preformed.
- G. Inside Corners: Job Formed or Preformed.
- H. Colors: 40 "Black".

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. Preformed Corners: Install preformed corners before installing straight pieces.

G. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.
 - a. Miter corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 1. Remove adhesive and other blemishes from surfaces.
 2. Sweep and vacuum horizontal surfaces thoroughly.
 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 099114 - EXTERIOR PAINTING (MPI STANDARDS)

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. Surface preparation and application of paint systems on the following exterior substrates:
 - a. Fiber-cement board.
 - b. Galvanized metal.
 - c. Wood.

1.3 DEFINITIONS

- A. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include preparation requirements and application instructions.
 - 2. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Behr Paint Company; Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Pratt & Lambert; a subsidiary of The Sherwin-Williams Company.
 - 4. Rodda Paint Co.
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.
- C. Source Limitations: Obtain paint from single source from single manufacturer.

2.2 PAINT PRODUCTS

- A. MPI Standards: Provide products complying with MPI standards indicated and listed in its "MPI Approved Products List."
- B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors:
1. **EP-1:** Benjamin-Moore #1043 “Blue Ridge Mountains” at field, doors and door frames, shutters.
 2. **EP-2:** Benjamin Moore #1040 “Spice Gold” at corner trim, window, door and louver trim.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Fiber-Cement Board: 12 percent.
 2. Wood: 15 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- E. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- F. Wood Substrates:
1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 2. Sand surfaces that will be exposed to view, and remove sanding dust.
 3. Prime edges, ends, faces, undersides, and backsides of wood.
 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions and recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 4. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional

coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 - 1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
 - 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
 - 3. Allow empty paint cans to dry before disposal.
 - 4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Cement Board Substrates:
 - 1. Latex System MPI EXT 3.3A:
 - a. Latex Prime Coat: Exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Low-Sheen Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.
- B. Galvanized-Metal Substrates:
 - 1. Latex System MPI EXT 5.3H:
 - a. Water-Based Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Semigloss Topcoat: Latex, exterior, semigloss (MPI Gloss Level 5), MPI #11.
- C. Wood Substrates: Exposed framing.

1. Latex over Latex Primer System MPI EXT 6.2M:
 - a. Prime Coat: Primer, latex for exterior wood, MPI #6.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Low-Sheen Topcoat: Latex, exterior, low sheen (MPI Gloss Level 3-4), MPI #15.

END OF SECTION 099114

SECTION 099124 - INTERIOR PAINTING (MPI STANDARDS)

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 surface preparation and the application of paint systems on the following interior substrates:
 - 1. Steel and iron.
 - 2. Galvanized metal.
 - 3. Gypsum board.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
 - 2. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 DEFINITIONS

- A. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- C. Product List: Use same designations indicated on Drawings and in the Interior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures of less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Behr Paint Company; Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Pratt & Lambert; a subsidiary of The Sherwin-Williams Company.
 - 4. Rodda Paint Co.
- B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors:
1. **IP-1:** Benjamin Moore #OC-43 "Overcast" at field.
 2. **IP-2:** Benjamin Moore #1617 "Cheating Heart" at spaced wood paneling.
 3. **IP-3:** Benjamin Moore #1040 "Spice Gold" at doors, frames, ladder.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. SSPC-SP 2.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 INSTALLATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- D. Painting Fire-Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

2. Paint the following work where exposed in occupied spaces:
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.

3.4 FIELD QUALITY CONTROL

- A. Dry-Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry-film thickness.
 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 2. If test results show that dry-film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry-film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
 1. Latex System, Alkyd Primer, MPI INT 5.1QQ:
 - a. Prime Coat: Primer, alkyd, anticorrosive, for metal, MPI #79.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.
- B. Galvanized-Metal Substrates:
 1. Latex System, MPI INT 5.3J:

- a. Prime Coat: Primer, galvanized, water based, MPI #134.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, semigloss (MPI Gloss Level 5), MPI #54.

C. Gypsum Board Substrates:

- 1. Latex over Latex Sealer System, MPI INT 9.2A:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior (MPI Gloss Level 4), MPI #43.

END OF SECTION 099124

DIVISION 10 – SPECIALTIES

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SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Potter Roemer LLC.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 3-A:40-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Larsens Manufacturing Company.
 - c. Potter Roemer LLC.
 - 2. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

- a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
 - 1. Mounting Height: Top of fire extinguisher to be at 42 inches above finished floor.

END OF SECTION 104416

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DIVISION 11 – EQUIPMENT

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SECTION 113013.01 - APPLIANCES

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. Refrigeration appliances.
 2. Laboratory Dryers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Product Schedule: For appliances.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturers' special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.6 WARRANTY

- A. Refrigerator/Freezer, Sealed System: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
 1. Warranty Period for Sealed Refrigeration System: Five years from date of Substantial Completion.
 2. Warranty Period for Other Components: One year from date of Substantial Completion.

- B. Laboratory Dryer: Limited warranty, including parts and labor for first year and parts thereafter, for on-site service on the product.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Accessibility: Where appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1.

2.2 REFRIGERATOR/FREEZERS

- A. Refrigerator/Freezer: Two-door refrigerator/freezer with freezer on top and complying with AHAM HRF-1.
 - 1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
 - a. Amana; Whirlpool Corporation.
 - b. GE Appliances; Haier Group.
 - c. LG Electronics USA, Inc.; LG Electronics Inc.
 - d. Samsung Electronics America, Inc. (SEA); Samsung Electronics Co., Ltd. (SEC).
 - 2. Type: Freestanding.
 - 3. Dimensions:
 - a. Width: 33 inches +/-.
 - b. Depth: 34 inches +/-.
 - c. Height: 68 inches +/-.
 - 4. Storage Capacity:
 - a. Refrigeration Compartment Volume: 17.6 cu. ft.
 - b. Freezer Volume: 6.2 cu. ft.
 - c. Shelf Area: Three adjustable glass shelves, 26 sq. ft.
 - 5. General Features:
 - a. Door Configuration: Overlay.
 - 6. Refrigerator Features:
 - a. Interior light in refrigeration compartment.

7. Freezer Features: One freezer compartment(s) with door(s).
 - a. Automatic defrost.
 - b. Interior light in freezer compartment.
8. Appliance Color/Finish: Stainless steel.

2.3 LABORATORY DRYER

A. Laboratory Dryer.

1. Cascade TEK; TFO-5 4.9 cu.ft. or Fisher Scientific 15-103-0512 6.3 cu.ft.
2. Type: On-counter.
3. Dimensions:
 - a. Width: 30 inches +/-.
 - b. Depth: 28 inches +/-.
 - c. Height: 38 inches +/-.
4. Provide (6) additional racks.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install appliances according to manufacturer's written instructions.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

END OF SECTION 113013

DIVISION 12 – FURNISHINGS

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SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED REQUIREMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Manually operated, single-roller shades.

- B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

- C. Samples for Verification: For each type of roller shade.

- 1. Shadeband Material: Not less than 10 inches square.

- D. Product Schedule: Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than one unit.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Springs Window Fashion; SWFcontract.
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. Bead Chains: Stainless Steel.
 - a. Loop Length: Full length of roller shade.
 - b. Limit Stops: Provide upper and lower ball stops.
 - c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
 - a. Provide for shadebands that weigh more than 10 lb. or for shades as recommended by manufacturer, whichever criterion is more stringent.

- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 1. Roller Drive-End Location: Right side of interior face of shade.
 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
 3. Shadeband-to-Roller Attachment: Removable spline fitting into integral channel in tube.

- C. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

- D. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

- E. Shadebands:
 1. Shadeband Material: Light filtering fabric.
 2. Shadeband Bottom (Hem) Bar: Extruded aluminum.
 - a. Type: Enclosed in sealed pocket of shadeband material.
 - b. Color and Finish: Clear Anodized.

- F. Installation Accessories:
 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
 - a. Shape: L-shaped.
 - b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 3 inches.
 2. Endcap Covers: To cover exposed endcaps.
 3. Installation Accessories Color and Finish: Clear Anodized.

2.3 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.
 1. Source: SWFcontract.

2. Type: Woven polyester and PVC-coated polyester.
3. Weave: Basketweave.
4. Thickness: 0.025"
5. Roll Width: 98 inches.
6. Orientation on Shadeband: Up the bolt.
7. Openness Factor: 4 percent.
8. Color:
 - a. SWF Zenith C9504 "Fog Stripe."

2.4 ROLLER SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:
 1. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
- B. Roller Shade Locations: As indicated on Drawings.

3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

- A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.
- C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

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SECTION 123653 - LABORATORY WORKSURFACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings, general provisions of the Fixed Price Construction Contract, and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Epoxy resin work surfaces.
 - 2. Setting materials.
- B. Related Requirements:
 - 1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.
 - 2. Section 064116 "Plastic-Laminate-Faced Architectural Cabinets"

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products high-pressure decorative laminate adhesive for bonding plastic laminate, epoxy resin work surface, hardware and accessories.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Submit plans, sections, and elevations as necessary to describe and convey layout, profiles, product components, edge conditions, and joints. Show details at 1/2" scale.
 - 2. Show locations and sizes of cutouts and holes in epoxy resin work surfaces.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- C. Samples for Verification:
 - 1. Epoxy resin work surface.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For each type of product.

1. Epoxy resin work surface
2. Adhesives.

1.5 QUALITY ASSURANCE

- A. Primary products furnished by a single manufacturer with minimum 10 years documented experience in work of this Section. Products are manufactured in ISO 9001 certified facility.
- B. Installer Qualifications: Minimum 5 years experience in work of this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 1. Use pallets larger than sheets during transportation.
 2. Package materials to prevent damage during shipping and handling.
- B. Storage:
 1. Store products in enclosed area protected from ultraviolet.
 2. Store products in manufacturer's unopened packaging until ready for installation.
 3. Store panels using protective dividers to avoid damage to surfaces.
 4. For horizontal storage, store sheets on pallets of equal or greater size than sheets with protective layer between pallet and sheet and on top of uppermost sheet.
 5. Do not store sheets or prefabricated panels vertically.
- C. Handling:
 1. If protective film is provided, do not remove until panel has been installed.
 2. Handle sheets to prevent damage.
 3. Remove stickers immediately after installation.

1.7 FIELD CONDITIONS

- A. Environmental Limitations:
 1. Do not install products under environmental conditions outside manufacturer's limits.
 2. Avoid direct exposure to sunlight.
 3. Do not use worksurfaces as bench, ladder or seating.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Basis of Design Product:
 - a. Durcon, Inc., A Wilsonart Company, 206 Allison Drive, Taylor Texas 76574, 512-595-8000, www.durcon.com.
 2. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Solid Epoxy Resin:

1. Sheets cast from modified epoxy resin and non-asbestos inert fillers; compounded mixture cured and thermoset specifically from formulation to provide exceptional physical and chemical resistance required in medium to heavy duty laboratory environments.
2. Sheets monolithic throughout without surface coating application.
3. Physical properties; minimum acceptable physical performance in accordance with SEFA 3 testing procedures:
 - a. Density/specific gravity: Tested to ASTM D792; minimum test rating of 133.6 lb/ft³ or 2.14 g/cm³.
 - b. Rockwell hardness: Tested to ASTM D785; minimum M scale rating of 109.
 - c. Fire resistance: tested to ASTM D635; classified as self-extinguishing.
 - d. Surface burning characteristics: Tested to ASTM E84; flame spread index 5 and smoke developed index of 185.
 - e. Coefficient of linear thermal expansion: Tested to ASTM D696; rating of 1.2 x 10⁻⁵ in/in^oF or 2.15 x 10⁻⁵ mm/mm^oC.
 - f. Heat deflection: Tested to ASTM D648; maximum 293^oF or 145^oC .
 - g. Flexural strength: Tested to ASTM D790; minimum rating 12.6 KPSI or 87 Mpa.
 - h. Flexural modulus: Tested to ASTM D790; 3240 KPSI or 22.4 Gpa.
 - i. Water absorption, 24 hours: tested to ASTM D570; maximum 0.03% by weight.
 - j. Compression strength: Tested to ASTM D695; minimum 32.7 kpsi or 226 Mpa.

B. Worksurfaces:

1. Color: Black.
2. Thickness: 1" unless otherwise indicated.
3. Warpage: maximum allowed warpage 1/16 inch in 36 inch span or 3/16 inch in 96 inch span.
4. Fabrication:
 - a. Shop fabricate in longest practical lengths.
 - b. Bond joints with highly chemical resistant cement with properties and color similar to base material.
 - c. Provide 1 inch overhang at front and exposed sides.
 - d. Provide 1/8 inch (3 mm) drip groove at underside of exposed edges, set back 1/2 inch from face.
 - e. Edge treatment: Standard 1/8 inch chamfered edge.
 - f. Corner treatment: exposed corners shall be eased slightly for safety.
 - g. Back and end splashes:
 - 1) Supplied loose for field installation.
 - 2) Same material and thickness as worksurfaces.
 - 3) 4" high unless otherwise indicated.
 - 4) Top mounted end splash where worksurfaces abut adjacent construction and at locations indicated on Drawings.
 - h. Joints: Maximum 1/8", bonded with epoxy grout.
 - i. Make joints between two benches level.
 - j. Locate joints away from sinks and over or near supports.
 - k. Allowable tolerances:
 - 1) Square: Plus or minus 1/64 inch for each 12 inches of length.

2.3 ACCESSORIES.

- A. Installation Materials: Manufacturer's joint adhesive, panel adhesive and sealants as required to suit project conditions.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Do not begin installation until cabinets have been installed.
- B. Confirm that surfaces to receive tops are plumb and level, with maximum deflection of 1/4 inch in 20 feet.

3.2 PREPARATION

- A. Clean surfaces prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install tops plumb and level.
- C. Scribe to adjacent surfaces in accordance with manufacturer's recommendations.
- D. Fasten tops to supporting construction with adhesives appropriate for use with adjoining construction and as recommended by manufacturer.
- E. Form field joints using manufacturer's recommended adhesive. Form joints to be inconspicuous and non-porous.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.4 PROTECTION

- A. Protect installed products until completion of Project.
- B. Touch up, repair, or replace damaged products.

END OF SECTION 123553

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DIVISION 13 – SPECIAL CONSTRUCTION – NOT USED

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DIVISION 14 – CONVEYING SYSTEMS – NOT USED

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DIVISION 21 – FIRE SUPPRESSION

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SECTION 212000 - FIXED AEROSOL FIRE-EXTINGUISHING SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire-extinguishing systems comprised of fixed condensed aerosol agent generators interconnected with agent release instrumentation and control for fire-suppression systems.

1.2 RELATED SECTIONS

- A. Section 26 05 00 – Common Work Results for Electrical applies to electrical work specified in this section.

1.3 REFERENCES

- A. National Fire Protection Association (NFPA)
 - 1. NFPA 70 National Electrical Code (NEC).
 - 2. NFPA 72 National Fire Alarm and Signaling Code.
 - 3. NFPA 101 Life Safety Code.
 - 4. NFPA 2010 The Standard for Fixed Aerosol Fire-Extinguishing Systems
- B. Underwriters Laboratories (UL)
 - 1. UL 268 Smoke Detectors for Fire Alarm Systems
 - 2. UL 464 Audible Signal Appliances
 - 3. UL 864 Control Units and Accessories for Fire Alarm Systems
 - 4. UL 1481 Power Supplies for Fire Protective Signaling Systems
 - 5. UL 1638 Visual Signaling Appliances
 - 6. UL 2775 Fixed Condensed Aerosol Extinguishing System Units
- C. National Institute for Certification of Engineering Technologies (NICET)
 - 1. NICET 1016-2 Program Detail Manual, Special Hazards Suppression Systems
- D. United States Environmental Protection Agency (EPA)
 - 1. EPA 59FR13044 Halon Substitutes Under Significant New Alternative Policy (SNAP)
- E. All separate requirements of the Authority Having Jurisdiction (AHJ).

1.4 DEFINITIONS

- A. *Condensed Aerosol Agent*. An extinguishing medium consisting of finely divided solid particles, generally less than 10 microns in diameter, and gaseous matter, generated by the exothermic oxidation of a solid aerosol-forming component.
- B. *Electrical Initiators (E-match)*. Encapsulated bridge-wire device fitted at top of aerosol generator which, when electrically energized, initiates the exothermic oxidation of the solid aerosol-forming component, producing the condensed aerosol agent fire suppressant.

- C. *Fixed Aerosol Fire-Extinguishing System.* A special hazard fire protection system employing one or more condensed aerosol generators interconnected with and actuated by an agent release fire alarm system for the purpose of total flooding a protected space with potassium-based aerosol fire suppression agent.
- D. *Aerosol Generator.* In condensed aerosol systems, a device for creating a fire extinguishing medium by means of exothermic oxidation.
- E. *Agent Release Fire Alarm System.* A protected premises fire alarm system that is part of a fire suppression system and/or which provides control inputs to a fire suppression system related to the fire suppression system's actuation and sequence of operations and outputs for other signaling and notification.
- F. *Transient Protector for Releasing Device (PN 3005014).* Device placed in releasing circuit before each e-match to protect against high voltage transient signals, such as lightning, that may cause the e-match to energize and accidentally initiate aerosol generator operation.
- G. *AHJ.* Authority having jurisdiction.

1.5 SYSTEM DESCRIPTION

- A. Design, furnish, install, connect, and test an agent release fire alarm and fixed aerosol fire-extinguishing system ready for operation. This shall include, but is not limited to:
 - 1. condensed aerosol agent generators and hardware
 - 2. agent release electrical initiators and wiring
 - 3. agent release control panel and batteries
 - 4. detection and alarm initiating devices
 - 5. alarm notification appliances
 - 6. lock-out and abort switches
 - 7. mounting hardware and wiring
 - 8. auxiliary power supply, control devices and annunciators (as needed)
 - 9. system user signage and documentation
- B. The fire-extinguishing system shall comply with requirements of NFPA 2010 and NFPA 72 except as modified and supplemented by this specification. System field wiring shall be supervised either electrically or by software-directed polling of field devices. Electrical installations shall comply with NFPA 70 and local code requirements.
- C. The fire-extinguishing system shall be manufactured by an ISO 9001 certified company and system and components shall be Underwriters Laboratories, Inc. listed under the appropriate UL standard given in Part 1.3 of this specification.
- D. The contractor designing and furnishing the fixed aerosol fire-extinguishing system and components shall be an authorized engineered system distributor of the supplying manufacturer. A NICET certified technician (minimum Level II) shall be employed on site to guide the final check-out and to ensure system integrity regardless of the contractor performing installation, connection, or testing for commissioning.
- E. Cross-zone operation. When a fire alarm condition is detected and reported by two system initiating devices which are cross-zoned these functions shall immediately occur:
 - 1. A programmed delay timer (typically 30 seconds) shall be started.

2. Warning audible circuits shall sound.
3. Electronic equipment in the hazard area requiring emergency power off (EPO) per NFPA 75 shall de-energize circuitry fans, area ventilation shall be shutdown, and dampers closed as required.
4. If abort is activated, the timer shall stop (or extend delay). Manual release shall override abort.
5. At completion of the delay timeout, the aerosol generator electrical initiators shall be activated.
6. Aerosol agent shall flood the protected area at design concentration with a minimum holding time of 10 minutes.

F. Basic circuitry performance.

1. Initiation Device Circuits (IDC) shall be wired Class B (NFPA Style B).
2. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z).
3. Releasing circuits shall be wired to supervise the aerosol generator electrical initiators
4. A single ground or open on any initiating device circuit or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

1.6 SUBMITTALS

A. Pre-construction Submittals:

1. All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met. For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Control/releasing panel manufacturers design or operation documents shall reference compatibility with the condensed aerosol system devices.
2. Include sufficient information, clearly presented, to determine compliance with the Specifications and Drawings in accordance with NFPA 2010, section 7.1.
3. Product data sheets shall be provided with printed logo or trademark shall of:
4. only one manufacturer for all the condensed aerosol fire suppression equipment
5. only one manufacturer for all the agent release fire alarm system
6. Compatibility documentation shall be provided showing the agent release fire alarm system is UL-listed and compatible with the fixed aerosol fire-extinguishing equipment
7. LEED Credit EA-4: Fire suppression agent shall be listed as a substitute for ozone-depleting chemicals under the EPA Significant New Alternatives Policy (SNAP) program. The condensed fire suppressant shall be Powdered Aerosol D as described in the EPA SNAP list.

B. Equipment Submittals:

1. Cover page shall give project name and address, Engineered Systems Distributor name and contact information, installing contractor's name and contact information (if different), equipment submittal date and revision level.
2. Scope of Work narrative including the sequence of operation for the fixed aerosol fire-extinguishing system shall describe:
3. Automatic or manual actuation
4. Control panel
5. Generator actuation

6. Notification appliance
 7. Coordination with other building components and systems
 8. Bill of material for the system shall include the part number, item description, and total quantity required for each system component or supplied material.
 9. System design data shall provide battery and supplemental NAC circuit calculations as well as agent design concentration calculations for the protected special hazard volume.
- C. Shop Drawings: NFPA2010
1. Cover page shall give project name and address, Engineered Systems Distributor name and contact information, installing contractor's name and contact information (if different), shop drawing package date and revision level.
 2. Shop drawings shall have title blocks with project name and address, drawing name, scale and sheet number, drawing date and revision.
 3. Information on all drawings shall be clearly presented, and include manufacturer's part numbers, power requirements and ratings, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts. Auxiliary control devices and annunciators and floor plans shall be included as needed. Hardcopy of calculation results from the condensed aerosol manufacturer's software system design program shall be included.
- D. Certifications. The fire suppression system contractor shall obtain any required local or state contractors licenses for this project as well as any required licenses for their installation technicians as required by state the project is located in and or the AHJ. The fire suppression system contractor shall also provide evidence of, technician NICET Level II certification and shall be an authorized distributor of the fire suppression system equipment manufacturer at time of equipment submittals.
- E. Permits- The fire suppression system contractor shall provide the necessary permits that are required for the installation of the fire suppression system.
- F. Operation and Maintenance Manuals. A complete as-built instruction and maintenance manual as well as the manufacturer's owner's manual shall be provided within 14 days after acceptance. Operation and maintenance manual shall be similar to information in Equipment Submittals, but revised to reflect changes made for final acceptance.
- G. Close-out Submittals. Project record drawings and final system program files shall be provided within 14 days after acceptance. Project record drawings shall be similar to Shop Drawings, but revised to reflect changes made for final acceptance.

1.7 QUALITY ASSURANCE

- A. Codes and Standards. System installation shall comply with the following NFPA codes and standards:
1. NFPA 70
 2. NFPA 72
 3. NFPA 101
 4. NFPA 2010
 5. UL 2775
 6. EPA 59FR13044
 7. MIL-STD-810G

- B. Equipment, Programming, and Installation Supervision.
 - 1. Services of an Authorized Fireaway Distributor shall be provided for furnishing all equipment, hazard volume agent design concentration, system programming, and installation supervision.
 - 2. The Engineered Systems Distributor shall provide proof of factory training within 14 calendar days of award of the contract.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Delivery. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer. Ensure transportation of materials, packaging signage, and documentation comply with domestic and international regulatory requirements.
- B. Storage. Store materials in clean, dry area indoors in accordance with manufacturer's instructions and Material Safety Data Sheet (MSDS) or Safety Data Sheet according to Regulation (SDSR). For any opened packaging for materials being placed back into storage, verify the permanent date code marking on the aerosol generator to ensure that the shelf life has not expired.
- C. Handling. Protect materials from damage, avoid dropping generators or subjecting to shock, electric currents, static discharge, excessive heat and extended periods of storage at temperatures greater than 149° F (65° C) or as specified in the MSDS/SDSR applicable to the material.

1.9 COORDINATION

- A. Coordinate the work in this section with the work of other sections, including sprinkler systems as specified in Section 21 10 00, electronic detection and alarms as specified in Section 28 30 00, and HVAC systems as specified in Section 23 00 00.

1.10 WARRANTY

- A. Warranty for aerosol fire suppression equipment is 12 months from date of installation. Warranty for agent release fire suppression system control panel and devices is also 12 months from installation.

PART 2 - PRODUCTS

2.1 GENERAL EQUIPMENT AND MATERIALS

- A. All equipment and components shall be new, and the manufacturer's current model. System equipment and devices shall be tested and listed by Underwriters Laboratories for use as part of a fire-extinguishing system and meeting the National Fire Alarm and Signaling Code (NFPA 72).
- B. All equipment and components shall be installed in strict adherence with manufacturers' Design, Installation, Operation and Maintenance manual instructions, agent design concentration calculation programs, and published technical bulletins.
- C. All equipment shall be attached to wall, ceiling and floor structures and shall be located as required by the manufacturer's instructions and held firmly in place using fasteners and supports adequate to support the required load.

- D. All equipment must be available through the manufacturer's authorized Engineered System Distributors and can be installed independent of the manufacturer.

2.2 FIXED AEROSOL FIRE-EXTINGUISHING SYSTEM

A. Manufacturer

1. The fixed aerosol fire-extinguishing system shall consist of Stat-X brand models by Fireaway Inc., 5852 Baker Road, Minnetonka, Minnesota 55345. Phone (952) 935-9745. Fax (952) 935-9757. Website: www.statx.com
2. References to manufacturer's model numbers and other information are intended to establish minimum standards for performance, function, and quality. Equivalent equipment from Fireaway Inc. may be substituted for the specified equipment, as long as minimum standards are met. No other manufacturers other than Fireaway Inc. will be considered for supplying the fixed aerosol fire-extinguishing system on this project.

B. Condensed aerosol agent generators shall be Stat-X "E" (Electrical) Series. The units shall be listed to UL category FWSA and ULC category FWSAC.

1. Agent container.
 - a. Generator housing shall consist of exterior and interior stainless steel cylindrical shells separated by insulating materials.
 - b. Exterior finish shall be brushed stainless steel, salt-spray resistant, and certified to MIL-STD-810G for extreme environments.
 - c. Top of housing shall be stainless steel and incorporate a 3/4" NPT fitting for direct connection to releasing circuit conduit.
 - d. Bottom of housing shall be stainless steel, sealed with a non-permeable hermetic sealed membrane, and shall incorporate a mechanical means to insure membrane rupture upon activation.
2. Condensed aerosol agent.
 - a. Aerosol agent generated shall be potassium based with 97% of particle sizes less than 5 microns.
 - b. Agent shall have zero ozone depletion potential (ODP), no atmospheric life (ALT) and negligible global warming potential (GWP) under EPA 59FR13044 (SNAP program).
3. Electrical initiators.
 - a. The Initiator element shall be of the encapsulated electric match type, integrated into the generator and incorporate a two-wire conductor for connection to the agent release control panel output circuit.
 - b. Device operating voltage is 12-24 VDC and supervisory current shall be ≤ 5 mA. Activation current shall be at least 1A for initiators connected in series or 0.5A for each parallel connected initiator.
 - c. Transient protection device shall be wired with each initiator, and shall be UL listed to Category SZWT2 and UOXX2.
4. Mounting hardware. Generators shall be mounted by means of stainless steel brackets and fasteners that allow for vertical and horizontal adjustment, or of the fixed L-bracket type.

C. Wiring of multiple generators. Generators may be wired individually to the control panel's agent release circuit or connected in series on a loop.

2.3 FIRE SUPPRESSION SYSTEM CONTROL PANEL

A. Manufacturer.

1. The agent release control panel and peripherals shall be manufactured by Potter.
2. References to manufacturer's model numbers and other information are intended to establish minimum standards for performance, function, and quality. Equivalent agent release from other fire suppression system control panel manufacturers may be substituted for the specified equipment, as long as minimum standards are met, and are verified to be UL-cross listed for automatic release of Stat-X aerosol generators. No other manufacturers other than Fireaway Inc. will be considered for supplying the fixed aerosol fire-extinguishing system on this project.

B. Fire Suppression Control Panel. The control panel shall be a Total Fire Systems 830030 Advantage Li Control Panel, Dual Detection, Dual Battery.

1. UL 864 Approved (with exceptions).

D. Detection and alarm initiating devices

1. The contractor shall design the fire detection system and select appropriate and prescribed fire detection devices in accordance with regulatory requirements and the applicable NFPA standards for the application, and for the fire hazards associated with the application.
 - a. Conventional Photoelectric Area Smoke Detectors.
 - b. Smoke detectors shall be listed to Underwriters Laboratories UL 268 for Fire Protection Signaling Systems.
 - c. The detector shall be a photoelectric type
2. Automatic Conventional Heat Detectors.
 - a. Mechanical heat detectors shall be listed to Underwriters Laboratories UL 521 for Heat Detectors for Fire Protective Signaling Systems.
 - b. The detector shall be either a single-circuit or a dual-circuit type, normally open. The detector shall be rated for activation at either 135°F or 200°F, and shall activate by means of a fixed temperature thermal sensor, or a combination fixed temperature/rate-of-rise thermal sensor.
 - c. The rate-of-rise element shall be activated by a rapid rise in temperature, approximately 15°F (8.3°C) per minute.
3. Linear Heat Detection Cable.
 - a. Linear heat detection cable shall consist of a fixed temperature sensing element comprised of two electrical current carrying wires separated by a heat sensitive insulation material.
 - b. The detection cable shall detect the specified temperature anywhere along the detector length.
 - c. The detection cable shall be constructed by spiral wrapping the two conductors with a protective mylar tape wrapped in protective outer coverings of cotton braid, PVC, or weather resistant Nylon.
 - d. The initiating circuits shall be capable of intrinsically safe service.
4. Air Sampling Smoke Detector.
 - a. Detector shall be aspirated laser-based mass light scattering type capable of detecting a wide range of smoke particle types and size.
 - b. Detector shall allow programming of smoke threshold alarm levels, time delays, faults, including airflow, detector, power, filter and network.
 - c. Monitoring contamination of the detector filter shall be employed to automatically notify when maintenance is needed.

- d. Detector(s) shall contain programmable relays for alarm and fault conditions.
 - e. Air sampling smoke detectors shall be capable of communicating to various
 - f. manufacturers' fire alarm or suppression control panel by relay connectivity or through a UL listed high level interface.
 - g. Sampling pipe and fittings shall be orange ¾" chlorinated polyvinyl chloride (CPVC) pipe.
 - h. Pipe shall be UL listed as an accessory for plenum use as per UL1887 standard. Mechanical pipe fasteners and hangers shall be approved for use with the CPVC pipe material.
5. Manual Release Stations.
- a. Manual release stations shall be UL listed with the fire suppression system control panel
 - b. Manual release stations shall be non-coded and an operated station shall automatically condition itself so as to be visually detected as activated. Station cannot be restored to normal after activation except by use of a key or hex.
6. Abort Stations
- a. Abort Stations shall include a momentary ("dead-man") switch that may be manually held in to cause abort of the release process.

E. Alarm notification appliances

- 1. Horns, Strobes, and Horn/Strobes.
- 2. Horn/strobes and strobes shall be listed to UL 1971 and shall be approved for fire protective service.
- 3. Outdoor horns, strobes and horn/strobes shall be listed for outdoor use by UL.

2.3 WIRING AND ELECTRICAL HARDWARE

A. Wire and wiring

- 1. All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system. Wiring installations shall comply with NFPA 70 and 72, regulatory, and customer specific installation policies.
- 2. Number and size of conductors shall be as recommended by the fire suppression system control panel manufacturer, but not less than 18 AWG (1.02 mm) for Initiating device circuits and 14 AWG (1.63 mm) for notification appliance circuits.
- 3. The fire alarm cable shall have a fire resistance rating suitable for the installation as indicated in NEC 760 (e.g., FPLR).
- 4. All fire suppression system wiring shall be new and shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire suppression system control panel.
- 5. All field wiring shall be electrically supervised for open circuits and ground faults.
- 6. 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 signal loss.
- 7. The fire suppression system control panel 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 SUPPRESSION SYSTEM. Fire suppression control panel primary power wiring shall be 12 AWG.
- 8. The control panel cabinet shall be grounded securely to a grounding rod.

B. Conduit, boxes and cabinets

1. Conduit shall be in accordance with the National Electrical Code (NEC), and state and local requirements.
2. All initiating and releasing device wiring shall be installed in a minimum of raceway as required by NFPA 2010. The wiring for this system may need to be installed in EMT based on the project requirements. When conduit is required, wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits if approved by the fire suppression control panel manufacturer.
3. When required, conduit shall be 3/4 inch (19.1 mm) minimum and shall not enter the fire alarm control panel, or any remote equipment back boxes, except where entry is specified by manufacturer.
4. All cabinets, terminal and junction boxes shall be UL listed for their purpose.

2.5 SYSTEM USER SIGNAGE

- A. All manual operating devices shall be identified as to the hazard area they protect and system abort switch shall be clearly recognizable for the purpose intended.
- B. Warning and instructions signs shall be provided at the entrance to and inside the protected area.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Fixed aerosol fire-extinguishing system
 1. Aerosol generators shall be of the type listed for intended purposes and shall be placed within the protected area in compliance with listed limitations with regard to spacing, floor coverage, thermal clearances, and alignment.
 2. The type of aerosol generators selected, their number, and their placement shall be such that the application design concentration will be established in all parts of the protected space.
 3. Agent shall not directly impinge on any loose objects, shelves, cabinet tops, or other surfaces, or on areas where personnel could be found in the protected space.
 4. Calculations shall be performed with the Fireaway Stat-X Designer Program and in accordance with the UL listed Design, Installation, Operation, and Maintenance manual. All examined unclosable openings in the protected enclosure shall be included in the design calculations and identified in the plan drawings.
- B. Agent release fire alarm system
 1. Installation shall be in accordance with the NEC, NFPA 72, NFPA 2010, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
 2. Fire detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.
 3. A transient protection for releasing device of the type listed shall be connected to each aerosol generator to protect against high voltage transient signals and unwanted system discharge.
 4. Per NFPA 2010, occupiable spaces shall include a "lock-out" device. A supervised disconnect switch shall be installed interrupting the releasing circuits to the aerosol

system to prevent unwanted system discharge during maintenance. Abort switches are optional and shall be considered in applications where the end user or AHJ require this safety feature in addition to the releasing system pre-discharge delay and notification appliance alarms.

- C. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

3.2 TESTS

- A. Provide the service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system.
- B. Preliminary functional tests.
 - 1. If system is connected to an alarm-receiving office, notify the office that a test is to be conducted and that fire service response is not desired.
 - 2. Notify all concerned personnel at facility that a test is to be conducted and instruct them as to sequence of operation.
 - 3. Comply with manufacturer's procedures as described in the manual. Note all warnings and safety requirements highlighted in the manufacturer's owner's manual, applicable building regulations, and end user's policies.
 - 4. Prior to installing each aerosol generator to the releasing circuit, using a multi-meter, verify that each (unconnected) aerosol generator initiator resistance is between 1.4 Ω to 2.0 Ω . Replace the generator if the initiator resistance is outside this range.
 - 5. Conduct a visual inspection of all installed aerosol equipment and verify compliance with the plans with regards to location, orientation, clearance and agent discharge path design requirements, and any room general arrangement installation changes that can affect the fire extinguishing system performance.
 - 6. Confirm each aerosol and all associated equipment is securely fastened to prevent vertical or lateral movement during system discharge. Use non-permanent thread locking products on the bracket fasteners for installations subject to vibration.
 - 7. Disable each aerosol generator so that activation of the release circuit will not release agent during fire detection system tests, and then reconnect the release circuit with a functional test device in lieu of each generator. The test device can be a quick response fuse and fuse holder, an indicating lamp, or an electrical test match to simulate the aerosol generator initiator element or releasing circuit loop. There is no NFPA 2010 requirement for actual discharge tests for commissioning of the fire extinguishing system.
 - 8. Confirm each detector for response, check for end of line resistors and polarity of all polarized devices, and check all supervised circuits for trouble response.
 - 9. Following the reset and reestablishing normal operating condition of the fire detection system, ensure that the releasing circuit is safely in stand-by mode, before reconnecting the aerosol generators to the releasing circuit. Check at the FACP that the releasing circuit is clear of any trouble or fault condition.
- C. Complete system functional tests.
 - 1. Each of the alarm, trouble, and fault conditions that the system is required to detect should be introduced on the system. Verify the proper receipt and that the releasing circuits will activate.
 - 2. Operate detection initiating circuit(s) and verify all alarm and notification appliance functions occur according to design specification.

3. Check installation and supervision of the fire detection devices to ascertain that they will function as specified.
4. Operate manual release and verify all manual release functions occur according to design specification.
5. Operate abort switch circuit (if supplied) and verify abort functions occur according to design functions.
6. Check audibility of tone and visibility of strobe light at all alarm notification devices.
7. Confirm that visual and audible supervisory signals are received and annunciated at the control panel and, if supplied, each remote annunciator.
8. Conduct tests to verify trouble indications for common mode failures, such as alternating current power failure.
9. Conduct tests to verify remote monitoring operations if applicable.
10. Confirm that all auxiliary functions such as door and vent closers, alarm-displaying devices, air-handling shutdown, and power shutdown operate in accordance with design specifications.
11. Verify integration with other building systems interlocked with the fire protection systems as required in the plans and specifications.

3.3 FINAL INSPECTION:

- A. At the final inspection a factory trained technician shall demonstrate that the systems function properly in every respect.
- B. At successful conclusion of all functional testing, return system to its fully operational condition.

3.4 INSTRUCTION:

- A. Provide instruction as required to the building personnel. "Hands-on" demonstrations of the operation of all system components and the entire system shall be provided.
- B. An as-built instruction manual that includes a full sequence of operation, a set of drawings and calculations should be maintained on site.
- C. The building personnel should also retain a copy of the aerosol fire extinguishing system owner's manual. Instruct building personnel on safety and operational procedures as described in the owner's manual. Review with building personnel the post-extinguishing system discharge and recovery procedures.

END OF SECTION 212000

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DIVISION 22 – PLUMBING – NOT USED

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DIVISION 23 – HEATING, VENTILATING AND AIR
CONDITIONING

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SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the Contract, including the General Requirements, apply to the work specified in this section.

1.2 DESCRIPTION OF WORK

- A. General: This section specifies several categories of provisions for mechanical work, including:
 1. Certain adaptive expansions of requirements specified in Division 1, as uniquely applicable to mechanical work.
 2. General performance requirements within the mechanical work as a whole.
 3. General work to be performed as mechanical work, because of its close association with mechanical work.

1.3 SUMMARY OF MECHANICAL WORK

- A. Drawings: Refer to the drawings for graphic representation, schedules and notations showing mechanical work.
 1. Specifications: Refer to Division 23 Sections for the primary technical specifications of mechanical work.

1.4 PERMIT AND FEES

- A. Pay all fees and obtain all permits necessary for completion and inspection of this work. Notify all interested authorities when this work is ready for any necessary inspection. No extra charge will be paid for the furnishing items required by the regulations, but not specified herein or on the Drawings.

1.5 COORDINATION OF MECHANICAL WORK

- A. General: Refer to the Division 1 sections for general coordination requirements applicable to the entire work. It is recognized that the contact documents are diagrammatic in showing certain physical relationships which must be established within the mechanical work, and in its interface with other work including utilities and electrical work, and that establishment is the exclusive responsibility of the Contractor.
 1. Arrange mechanical work in a neat, well-organized manner with piping and similar services running parallel with primary lines of the building construction, and with a minimum of 7 ft. 0 inches overhead clearance where possible. Avoid tripping obstacles, too.
 2. Locate operating and control equipment properly to provide easy access and arrange entire mechanical work with adequate access for operation and maintenance.
 3. Give right-of-way to piping which slope for drainage.
 4. Advise other trades of requirements in their work for the subsequent move-in of large units of mechanical work (equipment).
- B. Coordinate Drawings: For locations where several elements of mechanical (or combined mechanical and electrical) work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings (shop drawings) showing the actual physical dimensions (at accurate scale) required for the installation.

- C. Mechanical Coordinator: Provide a full time Mechanical Coordinator with not less than 5 years of supervisory experience in the installation of mechanical work similar to that of this project.

1.6 STANDARDS AND SYMBOLS

- A. General: Refer to the Division 1 sections for general administrative/procedural requirements related to compliance with codes and standards. Specifically for the mechanical work (in addition to standards specified in individual work sections), the following standards are imposed, as applicable to the work in each instance.
 - 1. AGA: American Gas Assoc.
 - 2. AWS: American Welding Society
 - 3. ANSI: American National Standards Institute
 - 4. AMCA: Air Moving and Conditioning Association
 - 5. ARI: Air-Conditioning and Refrigeration Institute
 - 6. ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers
- B. Symbols: Except as otherwise indicated, refer to the "ASHRAE Handbook of Fundamentals" for definitions of symbols used on the drawings to show mechanical work.

1.7 QUALITY ASSURANCE

- A. The Mechanical Sub-Contractor shall be regularly engaged in the installation of the systems described herein, and shall be fully familiar with the project conditions, and requirements of the applicable codes as they pertain to this project. The Contractor shall have been in business for a minimum of 5 years performing similar types of work, and its subcontractors must be licensed in the state of the project.
- B. The Mechanical Sub-Contractor shall submit, in writing, a warranty that guarantees that the work he performed is free from defects in material and workmanship for a period of one year from the date of final acceptance. All repairs or replacements required due to defective materials or workmanship, or due to non-compliance with code, shall be provided by the Mechanical Contractor at no additional cost to the owner. The warranty letter shall be included in the Operations & Maintenance Manuals.

1.8 SUBSTITUTIONS

- A. Equipment and materials that are specified by manufacturer and model number are listed to establish the quality desired. All equipment and materials by other manufacturers that is not specifically specified, must receive approval by manufacturers name prior to bid before substitutions can be allowed. (Refer to Building Requirements).
- B. Contractors that wish to have other equipment or materials from the responsibility for deviations from the intent of the plans and specification. The drawings were based on specific equipment and materials. The Contractor shall be solely responsible for any extra costs incurred by himself or any other Sub-Contractor, due to substitutions he has made. Also, approval of submittals does not relieve the Contractor from responsibility for errors in submitted shop drawings or catalog literature.

1.9 SUBMITTALS

- A. General: Refer to Division 1 Sections for general requirements concerning work-related submittals and for administrative submittals. Quantity does not include copies required by governing authorities, or by Contractor for its own purposes. Submittals include:
 - 1. Shop Drawings
 - 2. Product Data
 - 3. Certifications
 - 4. Test Reports
 - 5. Warranties
 - 6. Maintenance Manuals

- B. Maintenance Manuals shall include flow diagrams, maintenance instructions, operating instructions, parts listings, and copies of other's submittals indicated for inclusion. All equipment installed in the project shall be listed by model and serial numbers in the M&O Manuals. Organize each maintenance manual with index and thumb-tab marker for each section of information; bind in a 3-ring, vinyl-covered binder with pockets to contain folded sheets, properly labeled on spine and face of binder.
- C. Submittals will be reviewed twice at no additional charge. The submitting Contractor will be charged hourly for subsequent reviews of submittals that are rejected after the second review.

1.10 TEMPORARY FACILITIES

- A. General: Refer to the Division 1 sections for general requirements on temporary facilities.

1.11 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in factory prepared, water resistant, rigid containers. Containers should protect the product during shipping and handling. Inspect products for damage upon receipt. Do not accept damaged products. Return to supplier and replace with new at no cost to Owner. Do not attempt to repair any damaged product.
- B. Handle products carefully to avoid damage. All damaged products must be removed from the site. The Owner reserves the right to inspect all materials and may elect to reject any materials that are damaged.
- C. Store materials in a clean, dry place. Provide pallets or lumber to place materials on, so that they are kept above the ground. Provide heavy duty plastic wrap over all materials that are stored outdoors. Cover shall be tight in place to protect from dirt, fumes, water, and weather. Locate storage areas away from traffic patterns to avoid accidental damage.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Refer to Division 1 Sections for general requirements on products, materials, and equipment. The following provisions expand or modify the requirements as applicable to mechanical work.
- B. Product Listing: Prepare the product listing for mechanical work, separately from the listing(s) of products for other work. Include listing of each significant item of equipment and materials used in the work; and indicate the generic specification section number(s), and estimated date for start of installation. Bulk materials, including pipe and sheet metal, taken from Fabricator's/Installer's stock need not be listed.
 - 1. For principal equipment item, list the power and fuel consumption ratings, and the primary output ratings.
 - 2. Submit list within 7 days of Contract Date
- C. Compatibility: Provide products which are compatible with other products of the mechanical work, and with other work requiring interface with the mechanical work. Provide products with the proper or correct power characteristics, fuel-burning characteristics, and similar adaptations for the project. Coordinate the selections from among options (if any) for compatibility of products.

PART 3 - EXECUTION

3.1 ELECTRICAL PROVISIONS OF MECHANICAL WORK

- A. General: The electrical provisions of mechanical work, where indicated to be furnished integrally with mechanical work, can be summarized (but not by way of limitation) to include the following:
1. Motors
 2. Motor starters
 3. Wiring from mechanical equipment to electrical work termination (junction box or disconnect switch)
 4. Control devices such as:
 - a. Switches
 - b. Pilot lights
 - c. Interlocks and similar devices
 5. Electrical heating coils and similar elements in mechanical work
 6. Electrical work specified as mechanical work in the HVAC Control System
 7. Drip pans to protect electrical work
- B. Where mechanical devices are to be incorporated into fabricated electrical units at the factory, furnish devices to the designated factory, well in advance of time units are needed at the project.
- C. Standards: Where not otherwise indicated, comply with applicable provisions of the National Electrical Code, NEMA Standards, and sections of Division 26 of these specifications.
- D. Motors:
1. Manufacturer:
 - a. Toshiba
 - b. General Electric
 - c. Marathon
 - d. Reliance
 - e. WestinghouseWhere selection of motor manufacturer is within Contractor's control (independent of mechanical equipment selection), provide motors produced by a single manufacturer to the greatest extent possible.
 2. Temperature Rating: Class A insulation, except where otherwise indicated or required for service indicated.
 3. Starting Capability: As required for service indicated, but not less than 5 starts per hour.
 4. Phases and Current: Where not otherwise indicated 1/6 hp and smaller is Contractor's option; up to 1/3 hp, capacitor-start-single-phase; 2 hp and larger, squirrel-cage induction polyphase. Provide 2 separate windings on 2-speed polyphase motors. Coordinate with actual current characteristics; refer to Division 26 sections.
 5. Service Factor: 1.15 for polyphase; 1.35 for single-phase.
 6. Construction: General purpose, continuous duty; Design "B", except "C" for high starting torque applications.
- E. Frames: NEMA No. 48, except 56 for heavy-duty applications.
- F. Bearings: Shall be ball or roller and designed for thrust where applicable; shaft seals and be oil or permanently lubricated. No grease bearings, or sleeve type bearings will be allowed. All bearings shall have a minimum L-10 life of 100,000 hours. Sleeve type bearings are permitted only where indicated for light-duty fractional hp motors, 1/3 hp or less.
1. Enclosure Type: Open drip-proof for normal concealed indoor use, guarded where exposed to employees or occupants. Type II for outdoor use, except weather-protected Type 1 where adequately housed.
 2. Overload Protection: Built-in thermal; with internal sensing device for stopping motor, and for signaling where indicated.

3. Noise Rating: "Quiet", except where otherwise indicated.

G. Starters, Switches

1. Manufacturer
 - a. Allen-Bradley
 - b. Cutler-Hammer
 - c. General Electric
 - d. Square D
 - e. Westinghouse
2. Starter Characteristics: Type I general purpose; enclosure with padlock ears and supports for mounting as indicated. Starter type and size as recommended by motor manufacturer. Located disconnect switch within sight of motor.
3. Manual Switches: Provide on motors 1/3 hp and smaller, except where automatic control or interlock is indicated; include pilot light. Provide overload protection where not protected by panelboard circuit breaker or disconnect switch.
4. Magnetic Starters: Provide for 2 hp and larger motors, and for smaller motors on automatic control or with interlock switch. Include push buttons, pilot lights, reset, trip-free relay on each phase, undervoltage release, and devices for coordination with control system (including 120-volt transformer for control circuit where service exceeds 240 volts).

H. Wiring Connections:

1. Motors: Wired connections shall be in hard or flexible conduit
2. Heating Elements: 120-volt for less than 2 KW; single-phase higher voltage for up to 5 KW; 3-phase higher voltage for 5 KW and greater.
3. General Wiring: Comply with applicable provisions of Division 26 sections.

3.2 ACCESS

- A. Access Units – General: The work of this article is limited to the provisions for access through other work for access to mechanical work and does not include internal access provisions (within the mechanical work). In general, and where possible, furnish or furnish and mount required access units in other trades' work prior to their work, so that cutting and patching for the subsequent installation of such access units will not be required. In occupied spaces, provide finished access units of the maximum concealment type, including locks where appropriate, and matching access units provided in the same expanse of finish (for non-mechanical access, if any).
- B. Scope: The scope of access units to be furnished or provided as mechanical work includes those units indicated on the mechanical drawings or specified in Division 22 and 23 Sections, are those additional units required for adequate access to mechanical work that are not shown or specified individually.
- C. Access Doors: Standard welded-steel construction, 16 gage frames and 14 gage door panels, 175 degree concealed spring hinges, rust-inhibitive prime coat, flush cam lock (for screw-driver operation where keyed lock is not required), recessed to receive applied finish where applicable, 5-pin/disk tumbler lock where indicated.
- D. Removable Access Plates: Where only hand access is sufficient, provide removable plate-type access unit, of minimum size which will facilitate the required access. Provide units of the type, style, design, material and finish appropriate for the location and exposure in each instance. In exposed surfaces of occupied spaces provide round plate units, flush floor units and frameless low-profile wall units, primed-for-paint in painted surfaces and polished chrome or stainless-steel finish in other surfaces.

3.3 CUTTING AND PATCHING

- A. General: Comply with the requirements of Division 1 for the cutting and patching of other work to accommodate the installation of mechanical work. Except as individually authorized by the Architect/Engineer or Owners, cutting-and-patching of mechanical work to accommodate the installation of other work is not permitted, other than necessary penetrations of mechanical sheet metal work for electrical conduit and similar purposes.

3.4 EXCAVATING FOR MECHANICAL WORK

- A. General: The work of this article is defined to include whatever excavating and backfilling (but excluding insulating backfill) is necessary to install the mechanical work. Coordinate the work with other excavating and backfilling in the same area, including dewatering, floor protection provisions, and other temporary facilities. Coordinate the work with other work in the same area, including other underground services (existing and new), landscape development, paving, and floor slabs on grade. Coordinate with weather conditions and provide temporary facilities needed for protection and proper performance of excavating and backfilling. Refer to Division 2, Sections on Site Clearing and Earth Work.
- B. General Standards: Except as otherwise indicated, comply with the applicable provisions of Division 1 Sections for excavating and backfilling. Refer instances of uncertain applicability to the Architect/Engineer for resolution before proceeding.
- C. Piping Support: Support pipe 5 inches and smaller directly on undisturbed soil. Support pipe 6 inches and larger, and tanks/vessels, on compacted and shaped subbase material of depth shown but not less than 6 inches deep. Compact previously disturbed and unsatisfactory subsoil to provide adequate, uniform support for mechanical work; or excavate and replace with stable subbase material or lean concrete.
- D. Water-Bearing Pipe: Except as otherwise specifically indicated, place exterior underground water-bearing pipe (including drainage lines) a minimum of 3 feet below grade (measured on top of pipe). Provide 5 feet of cover under roadways.
- E. Sequencing: Delay backfill and encasement of piping until testing of piping system has been completed.
- F. Replacement of Other Work: Where it is necessary to remove and replace landscape work, pavement, flooring, and similar exposed finish work, engage the original installer to install the replacement work; except where the work existed prior to the work of this contract, engage only experienced and expert firms and tradespersons to replace the work.

3.5 MECHANICAL WORK CLOSEOUT

- A. General: Refer to Division 1 Sections for general closeout requirements.
- B. Record Drawings: For mechanical work, give special attention to the complete and accurate recording of underground piping and ductwork, other concealed and non-accessible work, branching arrangement and valve location for piping system sensors and other control devices, and work of change orders where not shown accurately by contract documents. Provide a set of record drawings per the requirements of Section 01700 – Project Closeout.
- C. Record Drawings must be received and approved before final payment will be made.

- D. Closeout Equipment/Systems Operations: Sequence operations properly so that work of project will not be damaged or endangered. Coordinate with seasonal requirements. Operate each item of equipment and each system in a test run of appropriate duration (with the Architect/Engineer present, and with the Owner's operating personnel present), to demonstrate sustained, satisfactory performance. Adjust and correct operations as required for proper performance. Clean and lubricate each system, and replace dirty filters, excessively worn parts and similar expendable items of the work.
- E. Operating Instructions: Conduct a walk-through instruction seminar for the Owner's personnel to be involved in the continued operation and maintenance of mechanical equipment and systems. Explain the identification systems, operating diagrams, emergency and alarm provisions, sequencing requirements, season provisions, security, safety, efficiency, and similar features of the systems.
- F. Seminar shall cover operations, maintenance, testing, adjusting, balancing, and troubleshooting. All instruction shall be verbal but accompanied with written material for personal files. The Owners reserve the right to video tape the presentation for future instruction sessions.
- G. Turn-Over of Operation: At the time of substantial completion, turn over the prime responsibility for operation of the mechanical equipment and systems to the Owner's operating personnel. However, until the time of final acceptance, the Contractor shall provide operating assistance by someone who is completely familiar with the work, to consult with and continue training the Owner's personnel.

3.6 OPERATION AND MAINTENANCE MANUAL

- A. Contractor shall provide O & M Manuals, as described in Section 01 77 00 – Closeout Procedures. Manuals shall list:
 - 1. Project Name
 - 2. General Contractor, address, and phone number
 - 3. Mechanical Contractor with address and phone number and contact person
 - 4. Mechanical Contractor's Foreman
 - 5. All suppliers of equipment, their addresses, and phone numbers
 - 6. Manufacturer's Warranties
 - 7. Contractor's Warranty Letter
 - 8. Each Section shall be marked with a labeled card stock tab divider

END OF SECTION 230500

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SECTION 233713 - GRILLES AND LOUVERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Grilles and registers
- B. Louvers

1.2 SUBMITTALS

- A. Submit product data under provisions of Section 01 31 00.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. See Schedule on Drawings.
- B. Substitutions shall be submitted under provisions of Section 23 05 00.

2.2 WALL TRANSFER REGISTERS/GRILLES

- A. Streamlined blades of which exceeds $\frac{3}{4}$ inch spacing, with spring or other device to set blades, horizontal face.
- B. Fabricate 1-1/4-inch margin frame with countersunk screw mounting and gasket.
- C. Fabricate of steel with 20 gage minimum frames and 22 gage minimum blades, steel, and aluminum extrusions, with factory prime coat finish.

2.3 LOUVERS

- A. Provide 2" deep louvers with blades on 45-degree slope heavy channel frame, bird screen with $\frac{1}{2}$ -inch square mesh for exhaust and $\frac{3}{4}$ inch for intake.
- B. Fabricate of 16 gage galvanized steel, welded assembly, with factory baked enamel finish.
- C. Furnish with interior angle flange for installation.
- D. See Grille & Register Schedule on drawings for specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install items in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

END OF SECTION 233713

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SECTION 238239 - ELECTRIC WALL HEATERS

PART 1 – GENERAL

1.1 APPLICABLE REQUIREMENTS

- A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 1 - General Requirements, Section 23 0500 - Basic Materials and Methods, and other Sections in Division 23 specified herein.

1.2 SCOPE

- A. All work to be furnished and installed under this Section shall comply with all the requirements of Division 1, and shall include, but not necessarily be limited to, the following:
 - 1. Electric wall heaters.

1.4 QUALITY ASSURANCE

- A. **Manufacturer's Qualifications:** Provide systems that are the standard product of an equipment manufacturer regularly engaged in the production of such units who issues complete catalog information on such products. Units shall not be fabricated by the Contractor.
- B. **Codes and Standards:** Provide components and devices conforming to the requirements of the latest edition of the following:
 - 1. National Electrical Manufacturers Association (NEMA): Provide electrical components that comply with NEMA Standards.
 - 2. National Fire Protection Association (NFPA):
 - a. 70 National electrical Code.
 - 3. Underwriters Laboratories: UL2021

1.5 SUBMITTALS

- A. **Product Data:** Submit manufacturer's technical product data for units showing dimensions, weights (shipping, installed, and operating), capacities, ratings, performance with operating point clearly indicated, motor electrical characteristics, finishes of materials, and installation instructions.
- B. **Shop Drawings:** Submit manufacturer's shop drawings indicating dimensions, weight (shipping, operating), required clearances, methods of assembly of components, and location and size of each field connection.
- C. **Maintenance Data:** Submit maintenance instructions, including instructions for lubrication, coil replacement, motor and drive replacement, and spare parts lists. Include this data, product data, shop drawings, and wiring diagrams in operating and maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver units to the site in containers with manufacturer's stamp or label affixed.
- B. Store and protect units against dirt, water, chemical, and mechanical damage. Do not install damaged units - remove from project site.
- C. Rigging: Comply with the manufacturer's rigging and installation instructions.

1.7 WARRANTY

- A. Provide general one-year (12 months) warranty. The warranty shall include parts, labor, travel costs, and living expenses incurred by the manufacturer to provide factory authorized service.

PART 2 - PRODUCTS

2.1 ELECTRIC WALL HEATERS

- A. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high-temperature protection.
- B. Fan: Aluminum or zinc-plated or powder-coated steel propeller directly connected to motor.
- C. Motor: Permanently lubricated. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment.
- D. General: UL and AGA approved or certified.
- E. Thermostat: Line voltage. Provide summer only fan on-off switch.
- F. Surface-Mounted Cabinet Enclosure: Steel with finish to match cabinet.
- G. Casing: Stamped-steel louver, with removable panels fastened with tamperproof fasteners. Baked enamel finish over baked-on primer with manufacturer's standard color selected by Architect, applied to factory-assembled and tested wall and ceiling heaters before shipping.
- H. Manufacturers: Hastings, Modine, Sterling, Reznor, Trane or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All equipment, unless otherwise shown or noted on the Drawings, is to be installed in accordance with industry standards and manufacturer's recommended installation instructions.
- B. Contractor to coordinate all electrical requirements with electrical contractor.

3.2 MANUFACTURER'S START-UP SERVICES

- A. The service technician shall verify correct installation, power wiring, and check for proper operation. The service technician shall provide final adjustments to meet the specified performance requirements.

END OF SECTION 238239

DIVISION 26 – ELECTRICAL

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SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electrical installation requirements.
5. Contractor Arc Flash Study requirements

B. Types of electrical connections specified in this section include, but are not necessarily limited to, the following:

1. Distribution Equipment
2. Grounding System
3. Motors
4. Motor Starters
5. Starters for Hood fans
6. Light Fixtures
7. Fire Alarm Equipment
8. Temperature Control Wiring
9. Emergency Equipment
10. HVAC Equipment
11. Water Heaters.
12. Sprinkler and Fire Alarm System
13. Disposers
14. Installation of operator controls.

C. Related Work

1. HVAC work: Provide conduit for wiring for HVAC equipment in accordance with the drawings and specifications.
 - a. Refer to Division 23 Section "Instrumentation and Control Devices for HVAC" for work performed by HVAC installer.
 - b. Refer to Division 26 Section "Low Voltage Electrical Power Conductors and Cables" for wiring.
2. Temperature control work to include conduit and wiring for smoke detector. Installation in ductwork included in Division 23 Sections. Refer to Division 23 Section "Instrumentation and Control Devices for HVAC" for work performed by HVAC installer.

3. Sprinkler alarm system shall be wired complete. Provide a "lock-on" device on the circuit breaker supplying the alarm system. Identify circuit breaker with a sign reading: "FIRE ALARM - DO NOT DISCONNECT". Sprinkler/ fire alarm shall be interlocked with HVAC control system(s) to stop the motors in the event of sprinkler-flow or fire alarm activation.
4. Premise Alarms: Provide conduits and outlet boxes for premise alarms indicated on the drawings or as required. Refer to Drawings.
5. Other conduit and wiring shown on the Drawings for energy management, refrigeration and temperature control.
6. Elevator work: Provide a set of auxiliary contacts connected to the disconnect for elevator controller required to activate battery lowering device to return elevator car to first floor to meet code.

1.2 SUBMITTALS

- A. Product Data: For sleeve seals.
- B. Certificates: For electrical installers, showing successful completion of an arc flash training course.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Sleeves for Rectangular Openings: Galvanized sheet steel.
 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Advance Products & Systems, Inc.; 337-233-6116
 - b. Calpico, Inc.; 650-588-2241
 - c. Metraflex Co.; 800-621-4347

d. Pipeline Seal and Insulator, Inc.; 800-423-2410

2. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
3. Pressure Plates: Carbon steel or Stainless steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating or Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.4 ELECTRICAL CONNECTIONS FOR EQUIPMENT

A. Manufacturers:

1. AMP Products Corp.; 800-468-2023
2. Burndy Corp.; 800-346-4175
3. Ideal Industries, Inc. 800-435-0705
4. Thomas and Betts Corp.; 800-816-7809

2.5 MATERIALS AND COMPONENTS FOR CONNECTIONS FOR EQUIPMENT:

- A. For each electrical connection indicated, provide a complete assembly of materials, including but not necessarily limited to, pressure connectors, terminals (lugs), electrical insulating tape, cable ties, solderless connectors and other items and accessories as needed to complete splices and terminations of the type indicated.
- B. Metal Conduit, Tubing and Fittings: Provide metal conduit, tubing and fittings of the type, grade, size and weight (wall thickness) required for each service.
 1. Raceways to be as specified in Division 26 Section "Raceway and Boxes."
- C. Conductors: Unless otherwise indicated, provide conductors for electrical connections as specified in Division 26 Section "Low Voltage Electrical Power Conductors and Cables."
- D. Connectors and Terminals: Provide electrical connectors and terminals as recommended by the connector and terminal manufacturer for the intended application.
- E. Electrical Connections Accessories: Provide electrical insulating tape, connectors and cable ties as recommended for the type job designated by the accessories manufacturers.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Fasten electrical components securely to structural support steel. Do not fasten to metal deck.
- B. Comply with NECA 1.
- C. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- F. Right of Way: Give right of way to piping systems installed at a required slope. Work shall be coordinated between trades prior to installation.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 ARC FLASH STUDY CONTRACTOR REQUIREMENTS

- A. The Contractor is responsible to provide the party Arch Flash Study and produce hazard labels for installation. The contractor will perform the following work associated with this article.
- B. NEW CONSTRUCTION
 - 1. Contractor is responsible to provide the Arc Flash Study and copy the Owner, all new wire lengths, sizes and breakers, above 125 amperes, feeding all electrical panels.
 - 2. Contractor will install all provided hazard labels to all panels.

END OF SECTION

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SECTION 260504 - DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of contract, including general and supplemental conditions sections, apply to work of this section.

1.2 FINAL TESTS AND DEMONSTRATIONS

- A. Test all work and all equipment installed to ensure its proper and safe operation. Check all interlocking and automatic control sequences, and test the operation of all safety and protective devices. Rectify all defects. Coordinate this work with the Power Company, supplier's representative and all other persons as directed by the OWNER or his representatives, in order to achieve the proper and intended operation of all equipment.
- B. Test, adjust and record operating voltages at each system level before energizing branch circuits. Transformer taps must be adjusted to obtain as near as possible nominal system voltage. Where transformer is under Utility jurisdiction, obtain services of Utility to correct voltage. Be responsible for replacement of all devices and equipment damaged due to failure to comply with this requirement.
- C. Balance load among feeder conductors at each panelboard, and reconnect loads as may be necessary to obtain a reasonable balance of load on each phase. Electrical unbalance shall not exceed 10%.
- D. Provide all instruments and equipment necessary to perform required tests.
- E. All checks and tests shall be permanently recorded and made available to the OWNER or his representatives. The tests shall include:
 - 1. System grounding
 - 2. Fuses:
 - a. Equipment nameplate requirement
 - b. Actual fuse rating
 - 3. Breakers:
 - a. Nameplate
 - b. Actual rating
 - 4. Motors:
 - a. Complete nameplate data
 - b. Overload relay element
 - c. Voltage and current phase readings
 - d. Direction of rotation
 - 5. Ampere readings on any cable operating in parallel to insure an even division of current.
- F. The above reading shall be made for all fuses, breakers, motors and parallel cables installed as part of this contract and connected to by Division 26. This testing shall be for all new equipment, whether furnished by the electrical contractor or not.

1.3 PROJECT CLOSEOUT CHECKLIST

A. Submit the following:

ITEM	SUPPLIED TO:	CHECK OFF
O&M Manual	ARCHITECT	_____
Certificate from systems suppliers stating that the system was started up, tested and Owner's instructions were given. Certificate shall have date of instructions and test and shall have the owner's representative's signature.	ARCHITECT	_____
Copy of marked up record drawing.	ARCHITECT	_____
Provide warranty for all equipment	ARCHITECT	_____

END OF SECTION

SECTION 260505 - THROUGH-PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 Applicable publications

A. Fire Test Requirements

1. ASTM E-814, "Fire Tests of Through Penetration Fire Stops".
2. ANSI/ UL1479, "Fire Tests of Through Penetration Fire Stops"
3. ASTM E-119, "Fire Tests of Building Construction and Materials".
4. ANSI/ UL263, "Fire Tests of Building Construction and Materials".
5. ASTM E-84, "Surface Burning Characteristics of Building Materials".
6. ANSI/ UL723, "Surface Burning Characteristics of Building Materials".

B. References

1. Underwriters Laboratories (UL) of Northbrook, IL "Fire Resistance Directory".
 - a. Through Penetration Firestop Systems (XHEZ)
 - b. Fill, Void or Cavity Materials (XHHW)
 - c. Firestop Devices (XHJI)
 - d. Forming Materials (XHKU)
2. All major building codes:
 - a. Uniform Building Code published by ICBO
 - b. Standard Building Code published by SBCCI.
 - c. National Building Code published by BOCA.
 - d. International Building Code published by ICC.
3. National Fire Protection Association (NFPA) of Quincy, MA "NFPA 101: Life Safety Code".
4. National Fire Protection Association (NFPA) of Quincy, MA "NFPA 70: National Electrical Code".

1.02 QUALITY ASSURANCE

A. Provide through-penetration firestop systems that comply with the following requirements:

1. 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 systems acceptable to authorities having jurisdiction.
2. Through-penetration firestop system products bear classification marking of qualified testing and inspection agency.
3. Engage an experienced installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer's willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

B. Obtain through-penetration firestop systems for each type of penetration and construction condition indicated from a single manufacturer.

C. Through-penetration firestop systems shall be subjected to necessary inspections and tests.

D. Keep areas of work accessible until inspection by authorities having jurisdiction.

- E. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.

PART 2 PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Provide through-penetration firestop systems that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- B. Provide components for each through-penetration firestop system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Performance Requirements
 - 1. Provide products that upon curing do not re-emulsify, dissolve, leach, break down or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water, or other forms of moisture characteristic during and after construction.
 - 2. Openings within walls and floors designed to accommodate cabling systems subjected to frequent cable changes shall be provided with re-enterable products specifically designed for retrofit.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through-penetration firestop systems (XHEZ) listed in Volume 2 of the UL Fire Resistance Directory, provide products of the following manufacturers as identified below:
 - 1. Manufacturers listed in the UL Fire Resistance Directory – Volume 2.

2.03 MATERIALS

- A. General: Use only through-penetration firestop system products that have been tested for specific fire-resistance-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture.
- C. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item.
- D. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.
- E. Firestop Putty Pads: Intumescent, non-hardening putty pads to be installed on metallic and nonmetallic electrical switch and receptacle boxes to reduce horizontal separation between boxes to less than 24”.
- F. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film.
- G. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame-retardant poly bag.

- H. Mortar: Portland cement based dry-mix product formulated for mixing with water at Project site to form a non-shrinking, water-resistant, homogenous mortar.
- I. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag).
- J. Silicone Foam: Multicomponent, silicone-based liquid elastomers, that when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install through-penetration firestop systems in accordance with "Performance Criteria" Article 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 through-penetration firestop systems products.
 1. Seal all openings or voids made by penetrations to ensure an air and water-resistant seal.
 2. Protect materials from damage on surfaces subjected to traffic.
- C. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.
- D. Clean all surfaces adjacent to sealed openings to be free of excess through-penetration firestop system materials and soiling as work progresses.
- E. Project conditions
 1. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.
 2. Do not install through-penetration firestop systems when substrates are wet due to rain, frost, condensation, or other causes.
 3. Do not use materials that contain flammable solvents.
 4. Do not install water-based or products that are conductive when wet in contact with energized electrical conductors. Exercise care when energizing penetrants.
- F. Coordination
 1. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
 2. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration firestop systems.
 3. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- G. Preparation
 1. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.
 2. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 3. Do not proceed until unsatisfactory conditions have been corrected.

END OF SECTION

SECTION 260519 - WIRE AND CABLE

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

- A. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
 - 1. NFPA 70 – National Electrical Code.
 - 2. ANSI/TIA/EIA-568-B.2.
- B. National Electrical Contractors Association (NECA), Standard of Installation, current edition.
- C. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
- D. Underwriters Laboratories, Inc. (UL).

QUALITY ASSURANCE

- E. Provide quality assurance in accordance with Section 26 05 00.
- F. Wire and cable manufacturers shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development and production in accordance with ISO 9001.

PART 2 PRODUCTS

WIRE AND CABLE – GENERAL PURPOSE (600V)

- A. General:
 - 1. THWN or THHN general purpose building wire insulated with polyvinyl chloride (PVC) and covered with protective sheath of nylon intended for lighting and power circuits at 600 volts or less, in residential, commercial, and industrial buildings.
 - 2. The wire shall be suitable for 90°C maximum continuous conductor temperature in dry locations and 75°C in wet locations and listed by Underwriters Laboratories for use in accordance with Article 310 of the National Electrical Code.
 - 3. All wire to be copper
- B. Conductors:
 - 1. Class B or Class C stranded, annealed uncoated copper per UL Standard 83 or 1063.
- C. Insulation:
 - 1. Each conductor shall be insulated with PVC and sheathed with nylon complying with the requirements of UL Standard 83 for Types THHN or THWN and UL Standard 1063 for Type MTW and CSA C22.2 No. 75 for T90 Nylon.
 - 2. Types THWN or THHN shall comply with the optional Gasoline and Oil Resistance rating of UL Standard 83. The insulation shall also comply with UL requirements for 105°C Appliance Wiring Material.
 - 3. The average thickness of PVC insulation, for a given conductor size, shall be as specified in UL Standard 83 for THWN or THHN. The minimum thickness at any point, of the PVC insulation, shall be not less than 90 percent of the specified average thickness.
 - 4. The minimum thickness at any point of the nylon sheath shall be as specified in UL Standard 83 for Types THWN or THHN.
 - 5. The PVC insulation shall be applied tightly to the conductor and shall be free-stripping.

- D. Identification:
 - 1. The wire shall be identified by surface marking indicating manufacturer's identification, conductor size and metal, voltage rating, UL Symbol, type designations, and optional ratings. The wire shall also be identified as C (UL) Type T90 Nylon or TWN 75, FT1.
- E. Tests:
 - 1. Wire shall be tested in accordance with the requirements of UL Standard 83 for Types THWN or THHN wire and for the optional Gasoline and Oil Resistance listing; as Type MTW to UL Standard 1063 (stranded items); as AWM to UL Standard 758 (stranded items); and as C(UL) Type T90 Nylon or TWN75.
- F. Usage:
 - 1. General use power wiring, minimum size No. 12 AWG.
 - 2. General use control wiring, minimum size No. 14 AWG.

WIRING CONNECTORS

- G. Polaris Type Mechanical Connectors:
 - 1. 8 AWG and larger wire for all motor connections.
- H. Spring Wire Connectors:
 - 1. 10 AWG and smaller wire.
- I. Compression Connectors (T&B Sta-Kon or equal):
 - 1. Fire alarm wiring.
 - 2. Control wiring.
 - 3. For those devices that are not rated to accept stranded wire.

PART 3 EXECUTION

EXAMINATION

- A. Verify that wire is in compliance with specifications.
- B. Verify that the interior of building has been protected from weather.
- C. Verify that mechanical work likely to damage wire and cable has been completed.
- D. Inspect wire for physical damage and proper connection.
- E. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- F. Verify continuity of each conductor.
- G. Feeder or branch circuits with ampacity greater than 100 amperes shall be tested after installation to measure insulation resistance of each conductor.
 - 1. All equipment shall be disconnected and the wire ends shall be cleaned and dried.
 - 2. Connect Megohmmeter between conductor and a grounded point in the enclosure and energize until the reading stabilizes.
 - 3. The Megohmmeter reading for each conductor shall not be less than 10,000 Megohms.

INSTALLATION

- H. Pre-Installation:
 - 1. Verify that mechanical work likely to damage wire has been completed.
 - 2. Completely and thoroughly swab raceway prior to installation.
 - 3. Wire and cable routing shown on drawings is approximate unless dimensioned. Route wire and cable to satisfy project conditions.

4. Determine required separation between cable and other work.
 5. Determine cable routing to avoid interference with other work.
- I. Conductor Sizing:
1. Conductor sizes are based on copper.
 2. Use conductor not smaller than No.12 AWG for power and lighting circuits.
 3. Use No.10 AWG conductors for 20 ampere, 120-volt branch circuits longer than 75 feet.
 4. Where circuit wiring length exceeds 100 feet, increase wire size as needed to maintain a maximum voltage drop of three percent.
 5. Wire and cable size shall be increased from size indicated or required by code to meet the following voltage drop requirements:
 - a. 3% drop for branch circuits.
 - b. 5% drop for motor circuits.
- J. Wire Pulling:
1. Pull all conductors into raceway at same time.
 2. No.4 AWG and larger wire and power cables shall be lubricated with pulling lubricant to reduce pulling tension and abrasion damage. The lubricant shall be water or wax based containing no oils or greases that may adversely affect cable jackets.
 3. The minimum bend radius and maximum pulling tension ratings of the wire and cable shall not be exceeded.
- K. Splices and Terminations:
1. Splices and terminations shall not be made within raceways.
 2. Clean conductor surfaces before splicing or terminating.
 3. Make splices, taps, and terminations to carry full amp capacity of conductors with no perceptible temperature rise.
 4. Wire nuts, "ScotchLocks", and similar devices may be used to splice 120V power circuits.
 5. Control, communication, and data transmission wire and cable shall not be spliced.
 6. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure. Do not rest cable on ceiling panels or support for the ceiling suspension system per NEC.
 7. Neatly train and lace wiring inside boxes, equipment, and panelboards.
 8. Clean conductor surfaces before installing lugs and connectors.
 9. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
 10. Use polaris type mechanical connectors for copper conductor splices and taps, 8 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
 11. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- L. Motors:
1. Motor wiring to motors less than 10 horsepower shall be spliced and terminated with fully insulated crimp-on end cap with a layer of self-vulcanizing rubber tape, followed by five layers of vinyl electrical tape. "ScotchLocks" and similar devices shall not be used.
 2. Motor wiring to motors 10 horsepower or larger shall be spliced and terminated with crimp-on ring terminal lugs, brass nuts, bolts and washers with a layer of self-vulcanizing rubber tape, followed by five layers of vinyl electrical tape. "ScotchLocks" and similar devices shall not be used.
- M. Wire Marking:

1. The ends of each conductor shall be marked with circuit number, motor number, wire or terminal number.
2. Labels shall be typed in black lettering with indelible ribbons on a white, heat shrink sleeve. Markers shall be shrunk around the wire to provide a tight, non-slip bond with a compatible heat gun.
3. Heat shrink wire markers shall be Brady Bradysleeve Type B-321 or B-322

N. Ground Wire Color Coding

1. Provide green insulated ground wire for #8 and smaller. #6 wire shall have green band per code.

END OF SECTION

SECTION 26 05 26

GROUNDING

PART 1 GENERAL

1.01 APPLICABLE PUBLICATIONS

- A. Conform to requirements of current ANSI/NFPA 70 - National Electric Code.
- B. Conform to current Underwriters Laboratories (UL) Specifications and Standards.
- C. Conform to current Telecommunication Industry Association (TIA/EIA).
- D. Conform to National Electrical Contractors Association (NECA) "Standards of Installation".
- E. Product specific standards and requirements are included in product specifications.
- F. EIA/TIA-607.

1.02 DESCRIPTION OF WORK

- A. Furnish and install a complete and operable grounding and bonding system as indicated on drawings and specified herein.
- B. Ground and bond all equipment required per all applicable codes whether or not specifically shown on drawings.
- C. Bond together system neutrals, service equipment enclosures, exposed non current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.
- D. Provide grounding from main electric service to telecommunications ground bus. Bond to all metal enclosures and racks.

1.03 QUALITY ASSURANCE

- A. Provide quality assurance in accordance with Section 26 05 04.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials and equipment furnished shall be current production of manufacturers regularly engaged in the manufacture of such items, and for which replacement parts are available. All materials and equipment shall be new (less than 1 year old when turned over to the Owner).
- B. Provide a complete and fully functional grounding system using materials and equipment of types, sizes, and rating as required to meet performance requirements. Use materials and equipment that comply with referenced standards and manufacturer's standard design and construction, in accordance with published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions. Provide all accessories necessary for a fully functioning system.

2.02 MECHANICAL CONNECTORS

- A. The mechanical connector bodies shall be manufactured from high strength; high conductivity cast copper alloy material. Bolts, nuts, washers, and lock washers shall be made of silicon bronze and supplied as a part of the connector body and shall be of the two bolt type.
- B. Split bolt connector types are not allowed.

- C. The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

2.03 COMPRESSION CONNECTORS

- A. The compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99 percent.
- B. The connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.
- C. The installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.
- D. The connectors shall be clearly marked with the manufacturer, catalog number, conductor size, and the required compression tool settings.
- E. Each connector shall be factory filled with an oxide-inhibiting compound.

2.04 EXOTHERMIC CONNECTIONS

- A. Select the appropriate kit for specific types, sizes, and combinations of conductors and other items to be connected. Field personnel shall be trained in execution of welds.

2.05 WIRE

- A. Material: Stranded copper.
- B. Grounding Electrode Conductor: Size as shown on drawings, specifications, or required by NFPA 70, whichever is larger.

2.06 TELECOMMUNICATIONS GROUND BUS BAR

- A. Telecommunications main grounding busbar
 - 1. Provide a pre-manufactured ground bus attached to the wall at the data rack location.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Verify proper labeling is provided on all telecommunications bus bars.

3.02 INSTALLATION

- A. General:
 - 1. Provide a separate, insulated equipment grounding conductor in all raceways.
 - 2. Connect grounding electrode conductors to metal water pipe:
 - a. Use a suitable ground clamp.
 - b. Make connections to flanged piping at street side of flange.
 - c. Provide bonding jumper around water meter.
 - 3. Provide ground wire in all surface metal raceways, and wireways.
 - 4. Receptacle grounding:
 - a. For all receptacle circuits, provide separate green ground wire in raceway system.
 - b. Standard receptacles may be used and green wire shall be directly connected to receptacle or to pigtail.
 - c. Provide #12 pigtail to ground all metal boxes.
 - d. Stranded wire twisted on ground terminal on device is not allowed.
- B. Telecommunication Ground Points

1. Telecommunications main grounding bus bar (TMGB).
 - a. Provide a pre-manufactured ground bus attached to the enclosure wall.
 - b. Terminate ground wire on bus.
 - c. Bond bus to enclosures.

END OF SECTION

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SECTION 260529 - SUPPORTING DEVICES

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

- A. Conform to requirements of current ANSI/NFPA 70 - National Electric Code.
- B. Conform to current American National Standards Institute (ANSI) standards.
- C. Conform to current American National Standards Institute ANSI B31.1 standards.
- D. Conform to National Electrical Contractors Association (NECA) "Standards of Installation"

1.2 DESCRIPTION OF WORK

- A. Furnish and install complete and operable support devices as required.
- B. Metal supporting devices shall be zinc galvanized or cadmium plated steel or malleable iron.
- C. Equipment and materials shall be supported with devices designed for such purpose. Wire or plastic ty-raps not acceptable.
- D. Where so specified on the drawings, provide stainless steel, PVC covered, or hot dipped galvanized.
- E. Refer to drawings or other portions of the specifications for particular pieces of equipment which may require more stringent equipment specifications than listed in this specification.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All materials and equipment furnished shall be current production of manufacturers regularly engaged in the manufacture of such items, and for which replacement parts are available. All materials and equipment shall be new (less than 1 year old when turned over to the Owner).

2.2 LIGHTING FIXTURE SUPPORT

- A. Provide items such as stems, hickeyes, bar hangers, and clips required to securely attach fixtures to ceilings or walls.
- B. Provide troffer arms for supports, lay-in troffers for exposed grid ceiling and grid troffer support clips in accordance with NEC and manufacturer's recommendations.
- C. Provide and install channel supports across main grid runners or grid supports, securely tied down or anchored for fixtures and devices mounted in suspended ceiling systems not causing tile to sag and so fixture or device cannot be lifted, rotated or displaced.
- D. Provide spacers or stabilizers to eliminate fixture instability.
- E. Drilled expansion insert type anchors suitable for load and application requirements such as sleeve anchors, lag shields, and plastic anchors.
- F. Provide auxiliary supports so fixtures can be drawn up tightly, tilted or rotated, and not affected by vibrations.

2.3 SUPPORTING STRUCTURES

- A. Rack supports of galvanized steel channel sections with adequate feet to allow secure mounting. Weld sections, do not use bolts.

2.4 MOUNTING EQUIPMENT

- A. For all panelboard, starters, disconnects, VFDs, control panel, etc. provide mounting panels of not less than 1/4 in. steel plate or 3/4 in. exterior grade plywood. Provide uniform mounting panels as far as practical. Paint plywood panels with 2 coats of fire rated gray enamel paint on all sides and ends.

2.5 CONDUIT SUPPORTS

- A. 1-hole galvanized steel straps for EMT, 2-hole galvanized steel straps for all other conduits. Do not use perforated hanger iron.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify locations prior to rough in.
- B. Verify mounting details

3.2 INSTALLATION

- A. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".
- B. Do not fasten supports to pipes, ducts, mechanical equipment, or other conduit.
- C. Do not use spring steel clips on ceiling support wires.
- D. Do not use powder actuated anchors.
- E. Obtain permission from Architect before drilling or cutting structural members.
- F. Fabricate supports from structural steel or steel channel. Rigidly weld members or use hexagon head bolts to present a neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- G. Install surface mounted cabinets and panelboards with minimum of four anchors.
- H. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch off wall.
- I. Use steel metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.
- J. Degrease and clean surfaces to receive nameplates and labels.
- K. Install nameplate and label parallel to equipment lines.
- L. Secure nameplates to equipment fronts using screws if so specified on drawings.
- M. Anchors:
 - 1. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31 and transfer of loading and stresses to connected equipment.
 - 2. Installation methods shall be in conformity with manufacturer's recommendations for maximum holding power.
- N. Conduit Supports
 - 1. Support conduit as follows:
 - a. Vertical Surfaces: Galvanized, heavy-duty, sheet steel straps; back straps provided for exposed conduit and conduit on exterior walls.
 - b. Horizontal Surfaces: Single or double rack channel trapeze, complete with conduit straps as required; supported with threaded hanger rods.
 - 2. Support 1 3/4 in. and larger conduit runs passing through floors at each floor with riser pipe clamps.

- O. Conduit Extending Through Roof:
1. Conduit extending through roof shall pass through ceiling box at roof line.
 2. Provide 14 ga minimum galvanized 12 gauge box complete with watertight soldered seams and flanged to serve as pitch pocket for each conduit or provide a neoprene boot as compatible with roof.
 3. Install conduit and pitch pocket in advance of roofing work.
 4. Coordinate with roofer for providing all appurtenances required so that the installed system complies with roofing installation.

END OF SECTION

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SECTION 260534 – RACEWAYS

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

- A. Conform to requirements of current ANSI/NFPA 70 - National Electric Code.
- B. Conform to current National Electrical Manufacturers Association (NEMA) Standards.
- C. Conform to current Underwriters Laboratories (UL) Specifications and Standards.
- D. Conform to current Telecommunication Industry Association (TIA/EIA).
- E. Conform to current American National Standards Institute (ANSI) standards.
- F. Conform to National Electrical Contractors Association (NECA) “Standards of Installation”.
- G. Product specific standards and requirements are included in Product Specifications.

1.2 DESCRIPTION OF WORK

- A. All wire shall be in conduit or surface raceway.
- B. Where conduit passes through areas of differing temperatures, such as into or out of cool-rooms, freezers, unheated and heated spaces, buildings, provide listed conduit seals to prevent the passage of moisture and water vapor through the conduit.
- C. When remodeling in existing construction, all conduit shall be concealed in walls, above ceiling, or below floors and located within building.
- D. When remodeling in existing construction and it is impossible to conceal conduit, a surface metal raceway (ie. Wiremold) shall be used where the raceway is used for 110 volt or greater power, where subject to physical damage, and for fire alarm wiring.
- E. Materials Included:
 - 1. Metal conduit.
 - 2. Flexible metal conduit.
 - 3. Liquidtight flexible metal conduit.
 - 4. Electrical metallic tubing.
 - 5. Nonmetallic conduit.
 - 6. Surface metal raceways.
 - 7. Wireways.

PART 2 - PRODUCTS

2.1 CONDUIT

- A. Minimum Size: 3/4 inch.
- B. Conduit types not listed below are prohibited.
- C. Rigid heavy wall galvanized steel conduits:
 - 1. Are to be used in the following locations:
 - a. Outdoors.
 - b. Underground, unless PVC is shown on drawings or called out in other portions of this specification.
 - c. In and under ALL concrete slabs, except for where PVC is allowed as stated in nonmetallic conduit portion of this specification.

- d. In sizes 2-1/2" and larger, where the conduit is exposed and where it is installed between the floor and 8' AFF. Above this height EMT conduit may be used.
 - e. In areas having moisture, dust or gases.
 - f. Exposed conditions where such mechanical protection is required.
2. Conduit:
- a. Impact and crush resistant mild steel tube with an accurate circular cross section, a uniform wall thickness, a defect free interior surface, and a continuous welded seam.
 - b. Interior and exterior surfaces thoroughly and evenly coated with zinc using the hot-dip galvanizing process.
 - c. Top-coated with a compatible organic layer to inhibit white rust and increase corrosion resistance.
 - d. Factory cut threads, 0.75-inch taper per foot, protected after cutting with an application of molten zinc.
3. Conduit Bodies:
- a. Ferrous metal construction electro-galvanized inside and out and coated with aluminum acrylic paint.
 - b. Tapered, threaded hubs with integral bushing.
 - c. Stainless steel hardware.
 - d. Cover constructed of same material with solid gasket.
4. Fittings:
- a. Ferrous metal construction electro-galvanized inside and out.
 - b. Components critical to performance such as set screws, split rings, and locknuts constructed of hardened steel or adequately designed to insure positive bonds.
- D. IMC (Intermediate Metal Conduit) is applicable in place of rigid heavy wall galvanized steel conduit in the following locations:
- 1. All areas except primary raceways.
 - 2. Outdoors.
 - 3. Underground.
- E. Thinwall conduit:
- 1. May be used in the following locations:
 - a. Indoors in dry locations (walls, ceilings, exposed).
 - b. In sizes 2 1/2" and larger, where installed above ceilings or installed more than 8' above the floor.
 - 2. Conduit:
 - a. Mild steel tube with an accurate circular cross section, a uniform wall thickness, a defect free interior surface, and a continuous welded seam.
 - b. Interior and exterior surfaces thoroughly and evenly coated with zinc using the hot-dip galvanizing process.
 - 3. Fittings:
 - a. Setscrew, steel construction electro-galvanized inside and out.
 - b. Insulated throat connectors.
 - c. Components critical to performance such as set screws, split rings, and locknuts constructed of hardened steel or adequately designed to insure positive bonds.
- F. Flexible Conduit:
- 1. Lengths limited to minimum necessary, 6' maximum.
 - 2. Limit use to dry areas.
 - 3. For connection of lighting fixtures, motors and similar equipment.
 - 4. To contain an equipment grounding conductor with phase conductors.

5. Bond grounding conductor to equipment served and nearest conduit system junction box.
 6. Usage:
 - a. Use only in conjunction with electrical metallic tubing
 7. Conduit:
 - a. Single strip, helically wound, galvanized steel with smooth interior surface conforming to applicable UL Standards.
 - b. Minimum size 1/2-inch may be used in lengths not to exceed 3-feet. All runs of flexible conduit shall be as short as practicable, of the same size as the conduit it extends and with enough slack to reduce the effects of expansion and vibration.
 8. Fittings:
 - a. Connectors shall be malleable iron or steel with insulated throat, squeeze-type, with annular gripping rib. Particular attention shall be given to maintaining ground bond and firm support through flexible connections. Connections shall have insulated throats.
- G. Liquid Tight Flexible Conduit:
1. Requirements same as for flexible conduit.
 2. Use in areas where environment is damp or could become damp or wet.
 3. To contain an equipment grounding conductor with phase conductors. Bond grounding conductor to equipment served and nearest conduit system junction box.
 4. Usage:
 - a. Use in conjunction with galvanized rigid metal conduit.
 - b. Use in conjunction with PVC coated galvanized rigid metal conduit.
 5. Conduit:
 - a. Single strip, helically wound, galvanized steel core inside and outside with smooth interior surface with sunlight resistant thermoplastic jacket suitable for ambient environmental conditions conforming to applicable UL Standards.
 - b. Jacket shall be positively locked to core to prevent sleeving.
 - c. All runs of flexible conduit shall be as short as practicable, of the same size as the conduit it extends and with enough slack to reduce the effects of expansion and vibration.
 6. Fittings:
 - a. Where used in conjunction with galvanized rigid metal conduit, connectors shall be malleable iron or steel, electro zinc plated, with insulated throat and taper threaded hub.
 - b. Where used in conjunction with PVC coated galvanized rigid metal or rigid aluminum conduit connectors shall be malleable iron or steel, electro zinc plated and PVC coated, with insulated throat and taper threaded hub.
 - c. Particular attention shall be given to maintaining ground bond and firm support through flexible connections.
 - d. All fittings shall be liquid tight.
- H. Nonmetallic Conduit (PVC):
1. In or under concrete slabs
 2. Where PVC conduit penetrates floor, convert to RSC
 3. PVC not allowed indoors above slab, except for single ground conductors in non-plenum areas.
 4. Conduit:
 - a. Made from polyvinyl chloride compound (recognized by UL), which includes inert modifiers to improve weatherability and heat distortion.
 - b. Rated for use with 90 degree C conductors. Material shall comply with NEMA Specification TC-2.

- c. The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections, which could mar conductors or cables.
 - d. Conduit, fittings and cement shall be produced by the same manufacturer to assure system integrity.
 - 5. Conduit Bodies:
 - a. Made from polyvinyl chloride compound (recognized by UL), which includes inert modifiers to improve weatherability and heat distortion.
 - b. Rated for use with 90 degree C conductors. Material shall comply with NEMA Specification TC-3.
 - c. Stainless steel hardware.
 - d. Cover constructed of same material with solid gasket.
 - 6. Fittings:
 - a. Made from polyvinyl chloride compound (recognized by UL), which includes inert modifiers to improve weatherability and heat distortion.
 - b. Rated for use with 90 degree C conductors. Material shall comply with NEMA Specification TC-3.
- I. MC Cable
 - 1. MC Cable: Interlocked steel sheath with grounding conductor. All conductors to be stranded copper, including the ground.
 - 2. Flexible metallic covered cable may be used in the following locations:
 - a. Building interior walls where interior walls are constructed of drywall over wood or metal studs. Flexible cable may be run from outlet to outlet horizontally in the walls. Where conduit exits top of wall, this shall be connected to a junction box within 24", and from that point, conduit shall be used.
 - b. MC cable may only be used in those walls that reach to the ceiling. It may not be used in partial height walls. It may not be used in any exposed ceiling areas.
 - c. MC cable shall be supported with steel straps that are designed for the cable diameter being installed.
 - d. MC cable cannot be used for low voltage refrigeration sensor wiring.

2.2 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): Rigid steel.
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit all steel fittings.

2.3 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction.
- B. Fittings: ANSI/NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction with PVC jacket.
- B. Fittings: ANSI/NEMA FB 1 with insulated throats.

2.5 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel or malleable iron, insulated throat connectors.

2.6 NONMETALLIC CONDUIT

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

2.7 SINGLE CHANNEL SURFACE METAL RACEWAYS

- A. Description: Sheet metal channel with fitted covers suitable for use as surface metal raceways.
- B. Size: As required. Maximum 40% fill.
- C. Finish: International white.
- D. Fittings: All fittings shall have bend radius controls in accordance with TIA/EIA category 6 standards. Boxes, extension rings. Furnish manufacturer's standard accessories.

2.8 WIREWAYS

- A. Description: General purpose type wireway.
- B. Knockouts: Bottom only.
- C. Size: As required.
- D. Cover: Hinged.
- E. Connector: Slip-in.
- F. Fittings: Lay-in type with removable top, bottom and sides with captive screws.
- G. Finish: Rust inhibiting primer coat with gray enamel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify routing and termination locations of conduit prior to rough in.
- B. Verify conduit routing. Routing as shown on Drawings is in approximate locations unless dimensioned. Route as required to complete wiring system.

3.2 INSTALLATION

- A. General:
 - 1. The complete installation shall be done in a neat, workmanlike manner in accordance with all applicable codes and the manufacturer's recommendations.
 - 2. Install all materials, assemblies and equipment in strict accordance with manufacturer's recommendations and instructions. Consult manufacturer for all wiring diagrams, schematics, sizes, outlets, etc. before installing.
 - 3. All conduit shall be installed in building unless indicated otherwise.
 - 4. All conduits stubbed into ceiling shall have end bushings.
 - 5. Install conduit in accordance with NECA "Standard of Installation."
 - 6. Install nonmetallic conduit in accordance with manufacturer's instructions.
 - 7. Arrange supports to prevent misalignment during wiring installation.
 - 8. Support conduit using coated steel or malleable iron straps, lay in adjustable hangers, clevis hangers, and split hangers.
 - 9. Group related conduits: support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
 - 10. Fasten conduit supports to building structure and surface under provisions of Section 26 05 29.

11. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
12. Do not attach conduit to ceiling support wires.
13. Arrange conduit to maintain headroom and present neat appearance.
14. Route exposed conduit parallel and perpendicular to walls.
15. Route conduit in and under slab from point to point.
16. Do not cross conduits in slab.
17. Maintain adequate clearance between conduit and piping.
18. Maintain 12 inch clearance between conduit and surfaces with temperatures exceeding 104 degrees F.
19. Cut conduit square using saw or pipecutter; de burr cut ends.
20. Bring conduit to shoulder of fittings; fasten securely.
21. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cleaner and cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
22. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
23. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Hydraulic one-shot bender may be used to fabricate factory elbows.
24. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
25. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
26. Provide suitable pull string in each empty conduit, except sleeves and nipples.
27. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
28. Ground and bond conduit under provisions of Section 26 05 26.
29. Identify conduit under provisions of Section 26 05 53.
30. Flexible metal conduit shall be used for connection to equipment subject to vibration and light fixture drops in all removable tile ceilings. Length shall not exceed 36" for equipment connections and 72" for light fixture connections. Minimum size 1/2", except 3/8" may be used for fixture drops. Install flexible conduit drops from independent junction box mounted above ceiling and accessible from below ceiling to recess ceiling mounted equipment. Allow for positioning of equipment to next tile increment.
31. Seal conduit with oakum or duct seal where they leave heated areas and enter unheated areas.
32. Surface raceway shall be installed to run parallel of all existing surfaces. Where raceway is used on ceiling, raceway shall be mounted at ceiling wall junction and extended from the junction box out to ceiling mounted device. Raceway shall be routed in corners and along mouldings to be as least obtrusive as possible.
33. Exterior cable and conduit installation.
 - a. Layout in trench may be started at either end unless the drawings indicate that it is to pitch for drainage. In which case the layout should be started at the lowest end. The cable and conduit shall be pitched 1" per 100 feet.
 - b. Include all excavation and backfill.
 - c. Cable and conduit shall be a minimum of 30" deep.
 - d. Cable and conduit shall be laid in a 6" sand bed and covered with another 6" of sand before backfilling with earth.
 - e. Provide Brady identotape 12" above all buried conduits and cables.
 - f. Provide #12 pull wire in all empty or spare conduits.
 - g. Restore existing surface back to its original condition.

- h. For all excavation, maintain erosion protection per Federal, State, and municipal requirements. All work associated with erosion control for excavation shall be done as per Federal, State and municipal requirements, as well as any plans, meetings, and other special conditions.
 - i. For all trenching that is under paved surfaces, backfill with structural material. Material shall be tamped in layers up to the point of the surface paving material.
 - 34. For intermediate floor structural slabs, assume that conduit cannot be installed within the slab. If installing conduit within the slab, coordinate this with the Construction Manager and verify with the Architect prior to installation.
 - 35. For on-grade slabs, the conduit may be run in or under the slab. Verify with concrete installation prior to running conduits in slab to determine if that conduit coordinates with the slab reinforcing.
- B. Conduits Stubbed Into Ceiling Space
- 1. All conduits stubbed into ceiling shall have end bushings or insulated connectors.
- C. Exterior Wall Penetrations
- 1. For all exterior wall penetrations, patch the wall with material to match the existing wall finish. The openings shall be as small as possible to minimize the impact on the existing wall finish. Install duct seal within the conduit to prevent air flow.
 - 2. When conduits are rising from the ground to penetrate the walls, furnish rigid steel conduit where conduit is exposed, and deep-back LB's condulettes or NEMA 4X stainless steel junction box.
- D. Interface With Other Products
- 1. Install conduit to preserve fire resistance rating of partitions and other elements.
 - 2. Route conduit through roof openings for piping and ductwork or through suitable roof jack. Coordinate location with roofing installation.

END OF SECTION

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SECTION 260535 - ELECTRICAL BOXES

PART 1 GENERAL

1.01 APPLICABLE PUBLICATIONS

- A. Conform to requirements of current ANSI/NFPA 70 - National Electric Code.
- B. Conform to current National Electrical Manufacturers Association (NEMA) Standards.
- C. Conform to current Underwriters Laboratories (UL) Specifications and Standards.
- D. Conform to National Electrical Contractors Association (NECA) "Standards of Installation".

PART 2 PRODUCTS

2.01 BOXES

- A. Pull boxes and junction boxes: Metal construction, conforming to National Electrical Code, with screw on or hinged cover.
- B. Flush mounted pull boxes: Provide overlapping covers with flush head cover retaining screws, prime coated.
- C. Small surface type junction boxes to be used in dry locations only for general purpose lighting and outlets shall conform to the following standard sizes and spec's:
 - 1. All boxes and covers shall be made of stamped steel. (No sectional boxes allowed).
 - 2. Minimum sizes:
 - a. Handy boxes 4 x 2 1/8 x 2 1/8
 - b. Octagon boxes 4 x 1 1/2
 - c. 4" sq. boxes 4 x 1 1/2 or 4 x 2 1/8
 - d. 4 11/16" sq. boxes 4 11/16 x 2 1/8
- D. Flush mounted outlet boxes used in dry locations shall conform to the following standards:
 - 1. All boxes and covers shall be made of stamped steel. No sectional boxes allowed.
 - 2. All boxes for communications outlets and blank outlets shall be of the "deep" variety.
 - 3. Minimum sizes:
 - a. Masonry boxes: minimum 3 1/2" deep, gang as required. These can be used for outlets or blank outlets.
 - b. 4" square wiring device boxes: 2 1/8" deep when used for communication or blank outlets. 1 1/2" or 1 1/8" deep when used for wiring devices. All 4" square boxes shall be equipped with square cut 1" raised covers of appropriate depth.
- E. Junction and Splice Boxes:
 - 1. Screw covers, galvanized after fabrication and not less than code dimensions.
 - 2. Entry openings in boxes shall be made with knock-out punches or hole saws.
 - 3. Burning of entry openings with a torch will not be acceptable.
 - 4. Paint exposed ferrous surfaces, 2 coats rust resisting paint.
- F. Provide outlet box divider barriers between 277/480 and 120/208 devices per N.E.C. and between switches for emergency and non-emergency circuits.
- G. Flush interior devices shall utilize 4" square box with raised covers or deep masonry boxes as appropriate.

- H. Raised covers to have square cut corners.
- I. Where existing boxes are reused, provide add-a-depth device rings to devices installed without proper box depth to finish surface.
- J. Box extensions will not be allowed.
- K. Through the wall type outlet boxes not allowed.
- L. Junction boxes and pull boxes shall not have knockouts. Enclosure type, material, and dimensions shall be as indicated on the drawings and as stated in these specifications. Where no type or size is indicated for junction boxes and pull boxes, they shall be one size larger than required by NEC.
- M. For exterior outlets, such as receptacles, use FS type outlet box flush mounted.
- N. Large junction boxes shall be constructed from steel in the following gauges:

2.02	BOX SIZE	MINIMUM STEEL GAUGE
2.03	UP TO 24" X 30" X 12"	14
2.04	24" X 36" X 8" TO 36" X 36" X 16"	12
2.05	36" X 42" X 8" AND LARGER	11

2.06 SURFACE METAL RACEWAY BOXES (WIREMOLD)

- A. All outlet and junction boxes used with surface metal raceway shall be manufactured by the surface metal raceway manufacturer to be compatible with the raceway used.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All fire alarm pull and junction boxes and their covers shall be painted red and have "fire alarm" written on the cover in large black non-washable ink. The lettering shall be such that it can be read from 10' away. Note that this requirement is in addition to the NEC requirements which requires that the box itself be marked in red.
- B. Boxes that are being installed in rough masonry surfaces (such as split face block) shall be installed in such a manner to allow the wiring device or light fixture and the associated device plate to be seated squarely. Have the masonry opening cut to the size of the plate and then box grouted in, or the rough masonry around the box shall be chiseled away and mortar installed around the box to provide a flat finish.
- C. Coordinate with the masonry installation all details of installation on rough masonry surfaces. Without coordination assume responsibility for all costs to provide the flat surface, which will require chiseling the surface of the rough masonry away and providing mortar to obtain this smooth finish.
- D. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- E. Install electrical boxes to maintain headroom and to present neat mechanical appearance.
- F. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

- G. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- H. Install boxes to preserve fire resistance rating of partitions and other elements, using materials and methods compatible with NFPA.
- I. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices with each other.
- J. Use flush mounting outlet boxes in finished areas.
- K. Do not install flush mounting boxes back to back in walls; provide minimum 6 inch separation. Provide minimum 24 inches separation in acoustic rated walls.
- L. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- M. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- N. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- O. Use adjustable steel channel fasteners for hung ceiling outlet box.
- P. Do not fasten boxes to ceiling support wires.
- Q. Support boxes independently of conduit.
- R. Use gang box where more than one device is mounted together. Do not use sectional box.
- S. Use 2 gang box with plaster ring for single telecommunication outlets.
- T. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- U. Large Pull Boxes: Boxes larger than 100 cubic inches in volume or 12 inches in any dimension.
 - 1. Interior Dry Locations: Use hinged enclosure.
 - 2. Other Locations: Use surface mounted cast metal box.
- V. Grounding
 - 1. All equipment shall be grounded in accordance with NEC, these specifications and drawings, and the equipment supplier's recommendations.
- W. Interface With Other Products
 - 1. Coordinate masonry cutting to achieve neat opening.
 - 2. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.
 - 3. Position outlet boxes to locate luminaires as shown on reflected ceiling plan.

END OF SECTION

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SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

- A. Conform to requirements of current ANSI/NFPA 70 - National Electric Code.
- B. Conform to National Electrical Contractors Association (NECA) "Standards of Installation".

1.2 DESCRIPTION OF WORK

- A. Furnish and install complete labeling as specified herein.
- B. All major pieces of electrical equipment shall have engraved labels indicating their functions. This shall include the following:
 - 1. All pushbuttons shall have engraved labels that are engraved as to its function.
 - 2. All relay cabinets shall indicate what the relay cabinet's function is.
 - 3. All bypass relay enclosures shall have engraved labels.
 - 4. Provide engraved labels for all air handling units, including HVAC units. Each unit shall be adequately marked with a tag indicating what unit number it is. An engraved tag shall also be provided on all air handling units which have smoke detector shut down. This tag shall indicate the following: "This air handler is equipped with smoke detector shut down. In the event that smoke is sensed in the ductwork, the air handler will turn off".
 - 5. All panelboards, starters, disconnects, and transformers shall have engraved labels indicating their functions.
 - 6. Provide engraved labels for all special pull and junction boxes that are associated with the building special systems.

PART 2 - PRODUCTS

2.1 ENGRAVED LABELS

- A. The label size shall be a minimum of 3/4" high and be 3" long. Labels may be attached with double backed adhesive tape unless indicated otherwise.
- B. Where references are made on the drawings to provide engraved labels, engraved nameplate or engraved plates, these should be engraved phenolic labels.

2.2 ENGRAVED PLATES

- A. Where references are made to engraved plates, this shall mean that the normal device plate shall have an engraving on it with black letters so as to indicate what this switch or device is used for.

2.3 BRANCH CIRCUIT OUTLETS: LABELING

- A. Each branch circuit outlet, receptacles, lighting, and any other device requiring 120/208/277 or 480 volt power, the contractor shall:
 - 1. Provide circuit, written in pencil or non-washable ink, inside of outlet box in an area that can be easily viewed when removing outlet faceplate.
 - 2. Write circuit number in ink on device between receptacles under plate.
 - 3. Optional: Provide typed label (not dyno label) for each circuit attached to device plate.
 - 4. Label each junction box outlet cover in non-washable marker as to circuit number routed through junction box.

2.4 PANELBOARDS: LABELING

- A. Panelboard Directory:

1. Prepare and affix a typewritten directory to the inside cover of each panelboard indicating loads controlled by each circuit.
2. Each distribution and lighting panelboard shall be equipped with a typewritten directory accurately indicating rooms and/or equipment being served.
3. Assume that originally directories will have to be developed based on the room numbers on the project drawings.
4. Near project completion, all directories will have to be changed to reflect actual room numbers as designated by the building occupant.
5. Include the cost of doing the original handwritten directory and revisions to the directory based on occupant room numbers.
6. Each existing panelboard that is revised, modified or has had circuits deleted or added to, shall have its directories retyped to reflect existing circuits and all modified circuits.
7. Each changed circuit on existing panelboards shall have an asterisk next to the revised or modified circuits.

B. Panelboard Identification:

1. Label per NEC 210.5.
2. Identify each panel with a suitably engraved nameplate mounted at the top of the front cover.
3. The nameplates shall be made of laminated black and white plastic with white on the outside.
4. The lettering shall be 1/4 inch high (minimum), engraved by cutting through the white outside layer so that the letters appear black.
5. Fasten nameplates with brass or stainless steel panhead screws.
6. Nameplate engraving shall match the numbers or letters shown on the drawings or assigned by the Owner's Representative.
7. Labels shall be engraved as to the function of the circuit breaker.
8. Labels shall also be engraved to indicate the load served by the circuit breaker.

C. Identify the source of the feeder circuit serving the panelboard.

2.5 DISTRIBUTION PANELS

- A. Each power panel that does not have a front hingeable door shall have an engraved laminated label attached adjacent to each circuit breaker.
- B. The label shall be engraved as to the function of that circuit breaker and the load served by that circuit breaker.
- C. For connections to existing switchboards in panel, provide engraved label for new circuit breaker and provide engraved labels for those circuit breakers that are modified.

2.6 STARTERS AND DISCONNECTS

- A. Each starter and disconnect furnished by this section or furnished by other sections but installed by this section shall have an engraved laminated label indicating which piece of equipment it controls.
- B. This requirement is waived if the disconnect or starter is attached directly to the piece of equipment that it is controlling or operating.

2.7 MISCELLANEOUS

- A. Branch circuits
 1. On branch circuits, use shall be made of all standard wire insulation colors available.

2. Where wires of different systems junction in a common box, each cable shall be grouped with its own system and identified using tags or identification strips.
- B. Special systems
1. All control, instrumentation, graphic display, alarm and other special system wires shall be clearly identified by description and location, using tags or identification strips.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
1. Degrease and clean surface prior to installing labels.
 2. Install nameplate and label parallel to equipment lines.
 3. Secure nameplates to equipment fronts using screws, if so specified on drawings.
 4. Identify Raceways of Certain Systems with Color Banding:
 - a. Band exposed or accessible raceways of the following systems for identification.
 - b. Bands shall be pretensioned, snap-around colored plastic sleeves, colored adhesive marking tape, or a combination of the two.
 - c. Make each color band 2 inches wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
 - d. Install bands at changes in direction, at penetrations of walls and floors, and at 40-foot maximum intervals in straight runs.

END OF SECTION

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SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 - APPLICABLE PUBLICATIONS

- A. American National Standards Institute/National Fire Protection Agency (ANSI/NFPA), Specifications and Standards, current edition:
 - 1. NFPA70 – National Electrical Code.
- B. National Electrical Contractors Association (NECA), Standard of Installation, current edition.
- C. National Electrical Manufacturers Association (NEMA), Specifications and Standards, current edition.
 - 1. NEMA PB 1 - Panelboards
 - 2. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
 - 3. NEMA AB 1 - Molded Case Circuit Breakers.
 - 4. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum)
- D. Underwriters Laboratories, Inc. (UL), Specifications and Standards, current edition:
 - 1. UL 50 - Enclosures for Electrical Equipment
 - 2. UL 67 - Panelboards.
 - 3. UL 98 - Enclosed and Dead-front Switches
 - 4. UL 489 - Molded-Case Circuit Breakers and Circuit Breaker Enclosures
- E. Canadian Standards Association (CSA), Specifications and Standards, current edition:
 - 1. CSA Standard C22.2 No. 29-M1989 - Panelboards and Enclosed Panelboards
 - 2. CSA Standard C22.2 No. 5-M91 - Molded Case Circuit Breakers
- F. Federal Specifications and standards, current edition:
 - 1. W-P-115C - Type I Class 1
 - 2. W-C-375B - Molded Case Circuit Breakers
 - 3. W-C-375B/Gen - Circuit Breakers, Molded Case, Branch Circuit and Service.
 - 4. W-P115C - Type 1 Class 2 Load Center
- G. American Society of Testing Materials (ASTM), Specifications and Standards, current edition.

1.2 - QUALITY ASSURANCE

- A. The panelboard manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design/development, production, installation, and service, in accordance with ISO 9001.
- B. All panelboards provided under this section shall be the products of a single manufacturer specializing in manufacture of panelboard products with a minimum of fifty years documented experience.

PART 2 - PRODUCTS

2.1 - 600VAC POWER DISTRIBUTION PANELBOARDS

- A. Interior:

1. Rated 600 vac or 250 VDC maximum. Continuous main current ratings as indicated on drawings not to exceed 1200 amperes maximum. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67.
2. UL Listed short circuit current ratings as indicated on the drawings with a maximum of 200,000 RMS symmetrical amperes. Main lug and main breaker panelboards shall be suitable for use as Service Equipment.
3. The panelboard interior shall have three flat bus bars stacked and aligned vertically with glass reinforced polyester insulators laminated between phases. The molded polyester insulators shall support and provide phase isolation to the entire length of bus.
4. The bussing shall be fully rated with sequentially phased branch distribution. Panelboard bussing shall be plated copper. Bus bar plating shall run the entire length of the bus bar. The entire interleaved assembly shall be contained between two U-shaped steel channels, permanently secured to a galvanized steel mounting pan by fasteners.
5. Interior trim shall be of dead-front construction to shield user from all energized parts. Main circuit breakers through 800 amperes shall be vertically mounted. Main circuit breaker and main lug interiors shall be field convertible for top or bottom incoming feed.
6. A solidly bonded copper equipment ground bar shall be provided. An additional copper isolated/insulated ground bar shall also be provided where indicated on the drawings.
7. Solid neutral shall be equipped with a full capacity bonding strap for service entrance applications. UL Listed panelboards with 200 percent rated solid neutrals shall have plated copper neutral bus for non-linear load applications where indicated on the drawings. Gutter-mounted neutral will not be acceptable.
8. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label, and Short Circuit Current Rating shall be displayed on the interior or in a booklet format. Leveling provisions shall be provided for flush mounted applications.

B. Group mounted circuit breakers through 1200A

1. Circuit breakers shall be group mounted plug-on with mechanical restraint on a common pan or rail assembly.
2. Circuit breakers equipped with line terminal jaws shall not require additional external mounting hardware. Circuit breakers shall be held in mounted position by a self-contained bracket secured to the mounting pan by fasteners. Circuit breakers of different frame sizes shall be capable of being mounted across from each other.
3. Line-side circuit breaker connections shall be jaw type.
4. All unused spaces provided, unless otherwise specified, shall be fully equipped for future devices, including all appropriate connectors and mounting hardware.
5. Thermal magnetic molded case circuit breakers
 - a. Molded case circuit breakers shall have integral thermal and instantaneous magnetic trip in each pole.
 - b. Circuit breakers shall be suitable for the interrupting rating indicated on the drawings.
 - c. Where true current limiting circuit breakers are indicated on the drawings, manufacturer shall submit one set of published let-through curves (as required by UL) to the owner.
 - d. Ampere ratings shall be as shown on the drawings.
 - e. Provide for all branch circuit breakers, unless indicated otherwise on the drawings.

C. Enclosures:

1. Type 1:
 - a. Boxes shall be galvanized steel constructed in accordance with UL 50 requirements. Zinc-coated galvanized steel will not be acceptable.

- b. Boxes shall have removable blank end walls and interior mounting studs. Interior support bracket shall be provided for ease of interior installation.
 - c. Maximum enclosure dimensions shall be 44-inches wide and 9.5-inches deep.
 - d. Type 1 Trim Fronts
 - 1) Trim front steel shall meet strength and rigidity requirements per UL 50 standards. Shall have an ANSI 49 medium gray enamel electrodeposited over cleaned phosphatized steel.
 - 2) Trim front shall be hinged 1-piece with door suitable for flush or surface mount as indicated on the drawings. Trim front door shall have rounded corners and edges free of burrs. A clear plastic directory cardholder shall be mounted on the inside of the door.
 - 3) Locks shall be cylindrical tumbler type with larger enclosures requiring sliding vault locks with 3-point latching. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock.
2. NEMA 3R if exterior

2.2 - 240VAC LIGHTING AND APPLIANCE PANELBOARDS

A. Interior:

- 1. Rated for 240 vac/48 VDC maximum. Continuous main current ratings, as indicated on the drawings, not to exceed 600 amperes maximum.
- 2. UL Listed short circuit current ratings as indicated on the drawings with a maximum of 200,000 RMS symmetrical amperes.
- 3. Provide one continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing shall be plated copper. Bus bar plating shall run the entire length of the bus bar. Main lug and main breaker panelboards shall be suitable for use as Service Equipment.
- 4. All current-carrying parts shall be insulated from ground and phase-to-phase by high dielectric strength thermoplastic.
- 5. A solidly bonded copper equipment ground bar shall be provided. An additional copper isolated/insulated ground bar shall also be provided where indicated on the drawings.
- 6. Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length. UL Listed panelboards with 200 percent rated solid neutrals shall have plated copper neutral bus for non-linear load applications where indicated on the drawings.
- 7. Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twist-outs covering unused mounting space.
- 8. Nameplates shall contain system information and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and short circuit current rating shall be displayed on the interior or in a booklet format.
- 9. Interiors shall be field convertible for top or bottom incoming feed. Main circuit breakers shall be vertically mounted. Sub-feed circuit breakers shall be vertically mounted. Interior leveling provisions shall be provided for flush mounted applications.

B. Main Circuit Breaker:

- 1. Main circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be true rms sensing and be factory calibrated to operate in a 40 degrees C ambient environment. Thermal elements shall be ambient compensating above 40 degrees C.

2. Two- and three-pole circuit breakers shall have common tripping of all poles. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the circuit breaker that allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.
3. Circuit breaker handle and faceplate shall indicate rated ampacity. Circuit breakers shall be UL Listed for reverse connection without restrictive line or load markings.
4. Circuit breaker escutcheon shall have international I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the ON or OFF position where indicated on the drawings.
5. Lugs shall be UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 75 degree C rated wire or 90 degree C rated wire as required by the application. Lug body shall be bolted in place; snap-in designs are not acceptable.
6. The circuit breakers shall be UL Listed for use with and provided with the following accessories where indicated on the drawings: Shunt Trip, Under Voltage Trip, Ground Fault Shunt Trip, Auxiliary Switch, Alarm Switch, Mechanical Lug Kits, and Compression Lug Kits.

C. Branch Circuit Breakers:

1. Circuit breakers shall be UL Listed with amperage ratings, interrupting ratings, and number of poles as indicated on the drawings.
2. Molded case branch circuit breakers shall have bolt-on type bus connectors.
3. Circuit breakers shall have an overcenter toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two- and three-pole circuit breakers shall have common tripping of all poles.
4. There shall be two forms of visible trip indication. The breaker handle shall reside in a position between ON and OFF. In addition, there shall be a red indicator appearing in the clear window of the circuit breaker housing.
5. The exposed faceplates of all branch circuit breakers shall be flush with one another.
6. Lugs shall be UL Listed to accept solid or stranded copper and aluminum conductors. Lugs shall be suitable for 75 degree C rated wire or 90 degree C rated wire as required by the application.
7. Breakers shall be UL Listed for use with the following accessories where indicated on the drawings: Shunt Trip, Auxiliary Switch, and Alarm Switch.

D. Enclosures:

1. Type 1:
 - a. Boxes shall be galvanized steel constructed in accordance with UL 50 requirements. Galvannealed steel will not be acceptable.
 - b. Boxes shall have removable endwalls with knockouts located on one end. Boxes shall have welded interior mounting studs. Interior mounting brackets are not required.
 - c. Box width shall be 26-inch wide maximum.
 - d. Type 1 Fronts:

- 1) Front shall meet strength and rigidity requirements per UL 50 standards. Front shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.
 - 2) Fronts shall be hinged 1-piece with door. Mounting shall be flush or surface as indicated on the drawings.
 - 3) Panelboards shall have fronts with concealed door hinges and mounted with trim screws. Front shall not be removable with the door locked. Doors on front shall have rounded corners and edges shall be free of burrs.
 - 4) Front shall have cylindrical tumbler type lock with catch and spring-loaded stainless steel door pull. All lock assemblies shall be keyed alike. One (1) key shall be provided with each lock. A clear plastic directory cardholder shall be mounted on the inside of door.
2. NEMA 3R if exterior

PART 3 - EXECUTION

3.1 - EXAMINATION

- A. Examine area to receive panelboard to assure adequate clearance for panelboard installation.
- B. Inspect completed installation for physical damage, anchorage, and grounding.
- C. Perform tests according to panelboard manufacturer's instructions.
- D. Tighten bus connections and mechanical fasteners.
- E. Touch-up scratched or marred surfaces to match original finish.

3.2 - INSTALLATION

- A. Install panelboards so that circuit breakers are not more than 6 feet above the finished floor or grade.
- B. Where panelboards or auxiliary cabinets are flush mounted in an outside wall, insulate the enclosure back and sides with 1/2 inch rigid fiberglass insulation and vapor barrier.
- C. Selectively connect branch circuits to equally balance currents in the panelboard busses.
- D. For each emergency panelboard, provide an engraved red nameplate with white lettering that indicates the following:
 1. "This electrical device is being fed from more than one location. Prior to servicing, all sources of power to this panel shall be disconnected."
- E. Install panelboards plumb and flush with wall finishes.
- F. Install panelboards such that top of panel is located at an elevation of 6-feet above finished floor elevation.
- G. Provide filler plates for unused spaces in panelboards.
- H. Stub five empty 1-inch conduits to accessible location above ceiling and additional five empty 1-inch conduits below floor (if space exists) of each flush-mounted panelboard to allow for future expansion.
- I. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 10 percent, rearrange circuits in the panelboard to balance the phase loads within 10 percent. Take care to maintain proper phasing for multi wire branch circuits.

- J. Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.
- K. Verify that bonding jumper is properly installed in service entrance rated panels.

END OF SECTION

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 APPLICABLE PUBLICATIONS

- A. Conform to requirements of ANSI/NFPA 70 - National Electric Code.
- B. Conform to current Underwriters Laboratories (UL) Specifications and Standards.
- C. Device specific standards and requirements are included in device specifications.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

- A. Switches shall be:
 - 1. UL listed for current and voltages indicated.
 - 2. Shall comply with NEMA standard publication WD-1, "Heavy Duty Wiring Devices".
 - 3. Federal Specifications Test WS-896 E.
 - 4. UL standard 20, 943 class A (GFCI) and 498.
- B. Switches shall be 20 ampere heavy duty specification grade unless noted.
- C. Switches shall have provisions for back and side wiring, screw clamp type suitable for solid or stranded wire with separate green ground screw.
- D. Switches shall be white unless noted.
- E. Switches shall be made of nylon or high impact resistant material.
- F. Modular switches with pigtailed terminals are allowed.
- G. Supply the following:
 - 1. Wall switch with:
 - a. 20 ampere, 120/277 volt rating.
 - b. Toggle handle.
 - c. Single-pole, double-pole, 3-way and 4-way switches shall be available.
 - d. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.
 - 2. Locked (keyed) wall switch with:
 - a. 20 ampere, 120/277 volt rating.
 - b. Key handle shall be removable in on or off position.
 - c. One key shall be supplied with each switch.
 - d. Single-pole, 3-way and 4-way switches shall be available.
 - e. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.
 - 3. Pilot lighted wall switch with:
 - a. 20 ampere, 120/277 volt rating.
 - b. Switch is lighted when in on position.
 - c. Single-pole and 3-way switches shall be available.
 - d. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.
 - 4. Lighted wall switch with:
 - a. 20 ampere, 120/277 volt rating.
 - b. Switch is lighted when in off position.
 - c. Single-pole and 3-way switches shall be available.
 - d. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.
 - 5. Momentary contact switch with:
 - a. 15 amperes, 120/277 volt rating.

- b. Three position two circuits, center off.
- c. Switch shall be normally open.
- d. Approved vendors are: Hubbell Wiring, GE.
- 6. Locked (keyed) momentary contact switch with:
 - a. 15 ampere, 120/277 volt rating.
 - b. Three position two circuits, center off.
 - c. One key shall be supplied with each switch.
 - d. Switch shall be normally open.
 - e. Approved vendors are: Hubbell Wiring, GE.
- 7. Single pole incandescent slide dimmer switch with:
 - a. 600watt, 1000 watt, 1500 watt or 2000 watt 120 volt rating.
 - b. On/Off rocker switch.
 - c. Preset levels may be maintained by use of On/Off switch.
 - d. Power leads may be integral.
 - e. Solid state circuitry.
 - f. Appropriately sized Lamp de-buzzing coil located in an acoustically isolated area.
 - g. Heat sink.
 - h. Face plate.
 - i. Size dimmers at 125% of connected load.
 - j. Approved vendors are: Lutron, Pass & Seymour.
- 8. Three way incandescent slide dimmer switch from one location with:
 - a. 600watt, 1000 watt, 1500 watt 120 volt rating.
 - b. On/Off rocker switch.
 - c. Preset levels may be maintained by use of On/Off switch.
 - d. Power leads may be integral.
 - e. Solid state circuitry.
 - f. Appropriately sized lamp de-buzzing coil located in an acoustically isolated area.
 - g. Heat sink.
 - h. Face plate.
 - i. Size dimmers at 125% of connected load.
 - j. Approved vendors are: Lutron, Pass & Seymour.

2.2 RECEPTACLES

- A. Receptacles shall be:
 - 1. UL listed for current, uses and voltages indicated.
 - 2. Shall comply with NEMA standard publication WD-1 and WD-6 standards.
- B. Receptacles shall be specification grade unless noted.
- C. Receptacles shall have provisions for back and side wiring, screw clamp type suitable for solid or stranded wire with separate green ground screw.
- D. Receptacles shall be white unless noted.
- E. Modular receptacles with pigtailed terminals are allowed.
- F. Receptacles shall be made of nylon or high impact resistant material.
- G. Receptacles installed in wet or damp locations shall be weather resistant.
- H. Receptacles shall be supplied with face plate.
- I. Supply the following:
 - 1. Duplex NEMA 5-20R heavy duty straight blade receptacles with:
 - a. 20 ampere, 120 volt rating.

- b. Standard face shape.
- c. 2-pole, 3-wire grounding
- d. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.
- 2. Weather Resistant Duplex NEMA 5-20R
 - a. 20 ampere, 120 volt rating
 - b. 2-pole, 3-wire grounding
 - c. Approved vendors: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour
- 3. Emergency circuit Duplex NEMA 5-20R heavy duty straight blade receptacles with:
 - a. 20 ampere, 120 volt rating.
 - b. Standard face shape.
 - c. 2-pole, 3-wire grounding
 - d. Red color.
 - e. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.
- 4. GFCI Duplex NEMA 5-20R receptacles with:
 - a. 20 ampere, 125 volt rating.
 - b. Standard GFCI face.
 - c. GFCI compatible face plate.
 - d. 2-pole, 3-wire grounding.
 - e. Approved vendors are: Cooper, Hubbell Wiring, Leviton, Pass & Seymour.

2.3 PLATE COVERS

- A. All plate covers shall be white (unless noted) smooth lexan or nylon.
- B. Cast metal plates: Die cast profile, ribbed for strength, flash removed, primed with gray enamel, furnished complete with four mounting screws.
- C. Steel plates: Hot dip galvanized 1.25 oz /sq. ft. minimum.
- D. Weatherproof receptacle plate shall be heavy duty type, cast aluminum with a deep cover hood to provide weatherproof protection while an attachment plug cap is inserted. Plate shall be code approved as "suitable for wet locations while in use". Weatherproof cover shall be provided with ¼" padlock hole. Plate must meet OSHA lockout/tagout requirements. Provide a padlock for each weatherproof receptacle cover installed on the project. All padlocks shall be keyed alike. Provide twenty spare keys for Owner's use.
- E. Surface box plates: Beveled, steel, pressure formed for smooth edge to fit box.
- F. Where two-gang boxes are required for single gang devices, provide special plates with device opening in one gang and second gang blank.
- G. Approved vendors are: Cooper, Hubbell Wiring, Leviton, and Pass & Seymour.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verify outlet boxes are installed at proper height.
- B. Verify wall openings are neatly cut and will be completely covered by wall plates.
- C. Verify floor boxes are adjusted properly; plumb and level.
- D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- E. Inspect each wiring device for defects.
- F. Operate each wall switch with circuit energized and verify proper operation.

- G. Verify that each receptacle device is energized.
- H. Test each receptacle device for proper polarity.
- I. Test each GFCI receptacle device for proper operation.
- J. Test that each receptacle is properly grounded.
- K. Adjust devices and wall plates to be flush and level.

3.2 INSTALLATION

- A. Install devices plumb and level.
- B. Install switches with OFF position down.
- C. Install vertical receptacles with grounding pole on top and horizontal receptacles with grounding pole to left.
- D. Connect wiring device grounding terminal to outlet box with bonding jumper.
- E. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- F. Connect wiring devices by wrapping solid conductor around screw terminal, or inserting into wire clamp. Wrapping conductor not allowed for stranded wire.
- G. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- H. Preparation:
 - 1. Provide extension rings to bring outlet boxes flush with finished surface.
 - 2. Clean debris from outlet boxes.

END OF SECTION

SECTION 263100 - PHOTOVOLTAIC COLLECTORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. PV systems description.
 - 2. Manufactured PV units.
 - 3. PV module framing.
 - 4. PV array construction.
 - 5. Inverters.
 - 6. System overcurrent protection.
 - 7. Mounting structures.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For PV modules.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies.
 - 3. Include diagrams for power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of PV modules that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Twenty-five years from date of Substantial Completion.
- B. Manufacturer's Special Minimum Power Output Warranty: Manufacturer agrees to repair or replace components of PV modules that fail to exhibit the minimum power output within

specified warranty period. Special warranty, applying to modules only, applies to materials only, on a prorated basis, for period specified.

1. Manufacturer's minimum power output warranties include, but are not limited to, the following warranty periods, from date of Substantial Completion:
 - a. Specified minimum power output to 80 percent or more, for a period of 25 years.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Refer to plans for equipment specifications. Deviation from specified manufacturer will require that contractor provide an updated PV design for approval by jurisdiction.

2.2 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled by a qualified testing agency and marked for intended location and application.

2.3 PV CAPACITIES AND CHARACTERISTICS

- A. Minimum Electrical Characteristics:

1. Rated Open-Circuit Voltage: 48.8 V dc
2. Maximum Power at Voltage (V_{pm}): 40.9 V dc.
3. Maximum System Voltage: 1500 V dc
4. Short-Circuit Temperature Coefficient: 50 mA/deg C.
5. Rated Short-Circuit Current (I_{sc}): 13.80 amps.
6. Rated Operation Current (I_{mp}): 12.96 amps.
7. Maximum Power at STC (P_{max}): 530 watts.

- B. Additional Electrical Characteristics:

1. Tolerance of P_{max}: 10 watts.
2. Power bifaciality: 70 %
3. Module Efficiency: 20.5 percent.
4. Wind Loading or Surface Pressure: 5400 Pa
5. Series Fuse Rating: 30 amps.

- C. Normal Operating Temperature Characteristics (NOTC):

1. Temperature at Nominal Operating Cell Temperature: 41 ± 3 deg C.
2. Temperature Coefficient (NOTC Open-Circuit Voltage): -0.26 % / deg C.
3. Temperature Coefficient (NOTC Short Circuit Current): 0.05 % / deg C.
4. Temperature Coefficient (NOTC Maximum Power): -0.34 % / deg C.

2.4 MANUFACTURED PV UNITS

A. Cell Materials: Monocrystalline.

1. c-Si.
2. Gallium arsenide (GaAs).

B. Module Construction:

1. Nominal Size: 32 inches wide by 64 inches long.
2. Weight: 42.8 lb.

C. Encapsulant: Ethyl vinyl acetate.

D. Front Panel: 2.0 mm heat strengthened glass with anti-reflective coating.

E. Backing Material: 2.0 mm heat strengthened glass.

F. Junction Box:

1. Size: 1.56 by 3.96 by 0.52 inch.
2. Fully potted, vandal resistant.
3. IP Code: IP65.
4. Flammability Test: UL 1703.

G. Output Cabling:

1. Quick, multiconnect, polarized connectors.
2. Two-Conductor Harness: No traditional return wire is needed from the end of a row back to the source combiner.

2.5 PV MODULE FRAMING

A. PV laminates mounted in anodized extruded-aluminum frames.

1. Entire assembly UL listed for electrical and fire safety, Class C, according to UL 1703, and complying with IEC 61215.
2. Frame strength exceeding requirements of certifying agencies in subparagraph above.
3. Finish: Anodized aluminum.
 - a. Alloy and temper recommended by framing manufacturer for strength, corrosion resistance, and application of required finish.
 - b. Color: As indicated by manufacturer's designations.

2.6 PV ARRAY CONSTRUCTION

A. Framing:

1. Maximum System Weight: 3,400 lbs.
2. Maximum Distributed System Weight: 2.5 psf.
3. Raceway Cover Plates: Plastic.
4. Coordinate requirements with structural engineer.

2.7 INVERTER

- A. Inverter Type: Hybrid.
- B. Control Type: Maximum power point tracker control.
- C. Inverter Electrical Characteristics:
 - 1. Maximum Recommended PV Input Power: 13 kilowatts.
 - 2. Maximum Open-Circuit Voltage: 500 V dc.
 - 3. PV Start Voltage: 125 V dc.
 - 4. MPPT Voltage Range: 150-500 V dc.
 - 5. Maximum Input Current per MPPT: 20A (self-limiting).
 - 6. Number of PV Strings per MPPT: 2.
 - 7. Number of Independent MPPT Circuits: 2.
 - 8. Nominal Output Voltage: 120/240 V ac.
 - 9. Maximum Output Current: 37.5 A.
 - 10. Peak Efficiency: 97.5 percent.
 - 11. CEC Weighted Efficiency: 96.5 percent.
 - 12. Communications Interface: Ethernet.
 - 13. Utility Interface: Utility-interactive inverter.
- D. Operating Conditions:
 - 1. Operating Ambient Temperatures: Minus 4 to plus 122 deg F.
 - 2. Storage Temperature: Minus 40 to plus 122 deg F.
 - 3. Relative Humidity: Zero to 95 percent, noncondensing.
- E. Charge controllers shall have the following:
 - 1. Overcurrent protection.
 - 2. Generator input breaker box.
 - 3. Automatic transfer relay.
 - 4. Digital display.
 - 5. Transformer.
 - 6. Disconnect switch.
 - 7. Shunt controller.
 - 8. Shunt regulator.
 - 9. Surge overload protection.
- F. Enclosure:
 - 1. NEMA 250, Type 1.
 - 2. Cooling Methods:
 - a. Fan convection cooling.
 - b. Passive cooling.
 - 3. Protective Functions:
 - a. AC over/undervoltage.

- b. AC over/underfrequency.
- c. Ground fault detection.
- d. Overtemperature.
- e. AC and dc overcurrent.
- f. DC overvoltage.
- g. Integral PV Arc Fault Detection
- h. Integral PV String Input Reverse Polarity Protection
- i. Integral PV Input Lightning Protection.
- j. Integral PV Rapid Shutdown Control

4. Standard LCD, four lines, 20 characters, with user display and on/off toggle switch.

G. Disconnects: Rated for system voltage and conductor.

H. Regulatory Approvals:

- 1. IEEE 1547.1.
- 2. IEEE 1547.3.
- 3. UL 1741.

2.8 SYSTEM OVERCURRENT PROTECTION

A. Reference drawings for overcurrent protection sizing.

2.9 MOUNTING STRUCTURES

A. Roof Mount: Extruded aluminum, rails, tilt legs, and roof standoffs.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1.
- B. Examine modules and array frame before installation. Reject modules and arrays that show shipping damage, are wet, are moisture damaged, or are mold damaged.
- C. Coordinate layout and installation of PV panels with roof assembly and other construction.
- D. Support PV panel assemblies independent of supports for other elements such as roof and support assemblies, enclosures, vents, pipes, and conduits. Support assembly to prevent twisting from eccentric loading.
- E. Install PV inverters, energy storage, charge controller, rapid shutdown, and system control in locations indicated on Drawings.
- F. Install weatherseal fittings and flanges where PV panel assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weathertight.

- G. Wiring Method: Install cables in raceways.
- H. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.2 CONNECTIONS

- A. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

END OF SECTION 263100

SECTION 265000 - INTERIOR LIGHTING FIXTURES

PART 1 GENERAL

1.01 APPLICABLE PUBLICATIONS

- A. Conform to requirements of current ANSI/NFPA 70 - National Electric Code.
- B. Conform to current Underwriters Laboratories (UL) Specifications and Standards.
- C. Conform to Wisconsin Administrative Code, Comm. 63.
- D. Conform to National Fire Protection Association NFPA 101.
- E. Conform to American National Standards Institute ANSI C 82.11-1993
- F. Conform to current National Electrical Manufacturers Association Standards.

PART 2 PRODUCTS

2.01 FIXTURE LAMPS

- A. Each fixture furnished hereunder shall be properly lamped with LED's of sizes indicated on plans and color quality as shown on plans.

2.02 DRIVERS

- A. All drivers to be universal voltage.
- B. Provide zero degree where called out on schedule.
- C. LED straight lamp drivers shall be:
 - 1. The maximum harmonic distortion produced by any ballast shall not exceed the following:
 - a. 15% at 120 volt.
 - b. 13% at 277 volt.
 - c. Total harmonic distortion shall not exceed 10%.
 - 2. Lamp Current Crest factor shall be maintained at 1.7 or less per ANSI C82.11-1993.
 - 3. Multiple lamp type.
 - 4. Drivers shall operate on the input frequency of 60 Hz rated at 95-125 volts (120 volt circuits) or 250-304 volts (277 volt circuits) with no more than 3% light output variation.
 - 5. Drivers shall incorporate lamp shutdown circuitry for end of lamp life protection.
 - 6. Provide coordination of drivers with other equipment that this section furnishes on this project, such that the operation frequency of the driver does not interfere with the operation frequencies of other pieces of equipment, such as ultrasonic light switches.

PART 3 EXECUTION

3.01 INSTALLATION

- A.
 - 1. Check and confirm ceiling material, recessing space and suspension system with General contractor before releasing the order for any recessed fixtures.
 - 2. Type of ceiling material and suspension system must be submitted with fixture order to ensure delivery of proper fixtures.
 - 3. Clean photometric control surfaces as recommended by manufacturer.

4. All fixtures to be supported from structural system, not from ceiling material.
 - a. All fixtures to be supported at minimum of 4 feet-0 inches on center.
 - b. All tees supporting fixtures to be secured directly to the structural system.
 - c. Intermediate tees shall not be used for mounting fixtures.
 - d. If fixtures occur between structural tees, fixture supports shall be installed by spanning structural tees from above, or by suspending a channel support above ceiling from building structure.
5. Recessed lay-in and non-recessed grid mounted lighting fixtures:
 - a. Where lay-in light fixtures are provided, the fixture shall be securely fastened to the ceiling framing members by mechanical means; such as bolts, screws, or rivet clips identified for use with the type of ceiling framing members and fixtures being used.
 - b. Grid mounted fixtures shall be mounted in the grid and attached to the grid system per NEC.
 - c. Separate mounting shall be provided to the ceiling structure above.
 - d. Provide a minimum of two supports per fixture per NEC.
6. Recessed luminaires:
 - a. Locate recessed ceiling luminaires as indicated on ceiling plan.
 - b. Relocate light fixtures as necessary and coordinate with other mechanical trades.
 - c. Coordinate installation in the field, where necessary.
 - d. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
 - e. Install clips to secure recessed grid-supported luminaires in place and separate support wires for each fixture.
 - f. Where recessed fixtures occur in tile ceiling, notify the ceiling contractor so fixture and tile arrangements can be coordinated.
 - g. Install recessed luminaires to permit removal from below.
7. Surface mounted luminaires:
 - a. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
8. Lighting fixtures installed in areas where there are not suspended ceilings:
 - a. In areas where lighting fixtures are installed where there are not suspended ceilings furnish all mounting hardware.
 - b. Continuous fixtures:
 - 1) In areas where lighting fixtures are mounted end-to-end in ceiling joist area, furnish support strut to solidly support the fixtures.
 - 2) Support strut may be B-line, Kindorf or equal.
 - 3) Strut shall be supported 8' on center using pendant hangers with swivels mounted on 4" square boxes.
9. Mounting hardware painting:
 - a. Mounting hardware to be installed prior to the ceiling being painted.
 - b. If it is not installed prior to that time, paint the support hardware.
10. Clearance heights:
 - a. Lighting fixtures shall be mounted to maintain maximum head clearance height and that the bottom of the fixtures shall be even with the bottom of the ceiling joists.
11. Mounting locations:

- a. The fixtures shall be mounted between the joists unless otherwise shown on the floor plans.
 - b. If fixtures are mounted perpendicular to joist, attach fixtures to the bottom of the joist and furnish steel support struts to the bottom of the joists for fixture support.
- 12. Individual fixtures:
 - a. In the ceiling joist area, individual fixtures shall be supported using pendant hangers with swivels mounted on 4" square boxes.
 - b. Fixtures shall be fed through one pendant end.
- 13. Flat ceiling spaces:
 - a. The fixtures shall be mounted tight to the ceiling unless it is required to adjust the fixture height because of mechanical equipment interference.
 - b. If required to adjust the fixture height because of mechanical equipment interference, support the fixtures using pendant hangers.
- 14. Mechanical Rooms:
 - a. Locate the lighting fixtures to coordinate with the mechanical equipment installation.
 - b. If required, these fixtures may be supported using chain with a cord connection.
 - c. If fixture cannot be mounted on the ceiling, lighting fixture shall be mounted on the wall using an adjustable wall bracket.
- B. Install specified lamps in each luminaire.
- C. Install accessories furnished with each luminaire.
- D. Connect luminaires using flexible conduit.
- E. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- F. Bond products and metal accessories to branch circuit equipment grounding conductor
- G. Daylit Areas:
 - 1. Ensure that all daylit areas are controlled as defined by local code.
 - 2. In general this area is defined as the width of the window (vertical glazing), plus 2' on each side extending 15' horizontally into the room.
 - 3. This area of the room shall have dual level control of lighting levels as required by local code.
 - 4. Actual window (vertical glazing) placement and/or grid layout may require an adjustment to switching configuration to comply with local code.
- H. Cleaning:
 - 1. Prior to turning the system over to the Owner, the system shall be physically cleaned.
 - 2. All appearance defects shall be carefully and professionally touched up so that the equipment is in "factory new" condition.
 - 3. At the completion of the work, remove from the building and the premises all rubbish and debris resulting from the work.
- I. Final Testing:
 - 1. Operate each luminaire after installation.
 - 2. Confirm codes are met regarding daylighting and dual level controls.
 - 3. Confirm light controls properly operate intended fixtures.

END OF SECTION

DIVISION 27 – COMMUNICATIONS – NOT USED

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**DIVISION 28 – ELECTRONIC SAFETY AND SECURITY – NOT
USED**

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DIVISION 31 – EARTHWORK – NOT USED

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DIVISION 32 – EXTERIOR IMPROVEMENTS – NOT USED

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DIVISION 33 – UTILITIES – NOT USED

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DIVISIONS 34-48 – NOT USED

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