PROJECT MANUAL

PROJECT NAME:

DOC 4JD CBC New Central Office Building

(Volume 1 of 2) (DIV 00 – DIV 22)

PROJECT ADDRESS:
818 S 10th St.
Council Bluffs, Iowa 51501

PROJECT DATE: April 21, 2026

OWNER:
Iowa Department of Administrative Services
109 Southeast 13th Street
Des Moines, Iowa 50319

OWNER PROJECT NUMBER: 9488.00

OWNER REQUEST FOR BID NUMBER: RFB 948800-01

CONSTRUCTION MANAGER:
Samuels Group
2929 Westown Parkway, Suite 200
West Des Moines, IA 50266

CONSTRUCTION MANAGER PROJECT NUMBER: 7813

ARCHITECT:
Savage-Ver Ploeg & Associates
1466 28th St, Suite 200
West Des Moines, IA 50266

ARCHITECT PROJECT NUMBER: 25079

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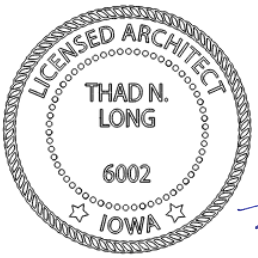
DOCUMENT 00 0107

SEALS PAGE

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline: Architect
Company Name: SVPA Architects, Inc.
Address: 1466 28th St.
West Des Moines, IA 50266
Telephone: (515) 327-5990
Name: Thad N. Long
License #: 6002

Stamp:



Responsibility: Divisions 01-14 Except sections noted below.

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline: Structural Engineer
Company Name: KPFF Consulting Engineers
Address: 604 Locust St #202
Des Moines, IA 50309
Telephone: (515) 279-3900
Name: Brad Stork
License #: 17332

Stamp:

Responsibility: Sections 01 4500, 03 3000 05 1200, 05 3100, 05 4000, 05 4400, 31 2005

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline: Mechanical Engineer
Company Name: Alvine Engineering
Address: 400 E Court Ave Unit 130
Des Moines, IA 50309
Telephone: (515) 243-0569
Name: Jason P. Jones
License #: 22600

Stamp:

Responsibility: Divisions 21-23

I hereby certify that the portion of this technical submission described below was prepared by me or under my direct supervision and responsible charge.

Discipline:	Electrical Engineer	Stamp:	
Company Name:	Alvine Engineering		
Address	400 E Court Ave Unit 130		
	Des Moines, IA 50309		
Telephone:	(515) 243-0569		
Name:	Nicholas A. Andera	Responsibility:	Division 26
License #	22839		

END OF DOCUMENT

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SECTION 00 0116

BID SUBMITTAL CHECKLIST

PART 1 - GENERAL

1.01 BID SUBMITTAL CHECKLIST

A. The Bidder is responsible to see that the bid is submitted online at IMPACS Electronic Procurement System on or before the due date and time specified. Late bids shall not be accepted.
B. Bids shall be typewritten or in ink. All information requested shall accompany the bid. All blocks shall be completed. Errors shall be lined out and initialed.
C. The right is reserved to reject any or all bids. The State may waive minor deficiencies or informalities in the best interest of the State of Iowa.
D. A properly prepared and submitted bid document is the bidder's responsibility.
E. Bids cannot be changed after the bid opening.
F. In all cases, no verbal communications by any party will override written communications from the issuing office.
G. The Bid Form shall be completed in full and signed and submitted by an officer of the bidder with authority to bind in a contract.
H. If Bid Bond is called for, it shall accompany the Bid submission.
I. If Non-discrimination Clause information is called for, it shall accompany the Bid submission
J. If Targeted Small Business Pre-bid Contact information is called for, it shall accompany the Bid submission.
K. If Certificate of Site Visit form is called for, it shall accompany the Bid submission.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

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SECTION 00 1113

NOTICE TO BIDDERS

RFB #948800-01

The Iowa Department of Administrative Services will be receiving bids for the construction of a new two-story office building at 818 S. 10th St., Council Bluffs, Iowa 51501. The building is approximately 14,136 SF including forty offices, breakrooms, restrooms, conference rooms, restrooms, mechanical space, and lobby area.

The Iowa Department of Administrative Services anticipates construction to begin on June 15, 2026 and end on June 18, 2027.

Bids must be received no later than **2:00 pm, Thursday, May 21, 2026**. Late bids will not be considered. Bids shall be submitted on IMPACS Electronic Procurement System. The Bid shall be accompanied by a Bid Security as set forth in the Instructions to Bidders in the amount of 5% of the total bid amount. Each bid shall be accompanied by a bid bond, cashier's check or a certified check drawn upon a solvent bank chartered under the laws of the United States of America.

Bid Opening
The time and place of bid opening will be held at meet.google.com/wot-fbdm-sqx and teleconference number 636-400-3049 Pin: 838039797 at 3:00 pm on May 21, 2026.

The Iowa Department of Administrative Services reserves the right to reject any and all bids, and to waive irregularities and to accept a bid that is deemed in the best interest of the State of Iowa.

Bidders must comply with all affirmative action/equal employment opportunity provisions of the State of Iowa and the Federal Government.

This project is exempt from Iowa Sales Tax. Davis Bacon Wages **will not** apply to this project.

Questions must be submitted by 2:00 pm, Friday, May 8, 2026, to the Issuing Officer.

Bidding documents may stipulate a specific product. Substitute product will be considered if a written request is received by 2:00 pm, Monday May 11, 2026, prior to bid opening. Substitution requests will be considered for all products per Section 01 2500 Substitution Procedures, even if the specification does not include a statement such as "or equal," "equal to," "equivalent to," or "basis of design," unless otherwise noted.

An **optional** Pre-Bid meeting will be held on Tuesday, May 5, 2026 at 10:00 am at the Dept. of Corrections (Adult Parole & Probation Office) located at 801 S 10th St., Council Bluffs, Iowa 51501. This meeting is not mandatory but is highly recommended.

Bidding Documents, including drawing sheets bearing the project name Iowa DAS – DOC 4JD CBC New Central Office Building, Dated 04/21/26 and the Project Manual prepared by SVPA dated 04/21/26, may be obtained from Beeline & Blue by visiting www.beelineandblue.com or by calling (515) 244-1611 on Monday, April 27, 2026.

For further information regarding this project contact:
Michael Bradbury – Issuing Officer
Phone: (515) 515-823-9327
E-Mail: construction.procurement@iowa.gov

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SECTION 00 2113

INSTRUCTIONS TO BIDDERS

RFB #948800-01

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Description
B. Owner
C. State Agency Representatives and Contacts
D. Proposal Form and Submissions
E. Taxes
F. Alternate Bids
G. Drawings
H. Bid Security
I. Due Date and Time for Receipt of Bids
J. Commencement and Completion Date
K. Site Visit
L. Pre-bid Meeting
M. Questions
N. Addenda and Interpretations of the Contract Documents
O. Substitutions
P. Obligation of Bidder
Q. Public Records and Requests for Confidential Treatment
R. Withdrawal of Bid
S. Bid Closing
T. Basis of Bids
U. Informalities/Rejection of Bids
V. Consideration of Bids
W. Preference
X. Qualifications
Y. Insurance
Z. Form of Agreement between Owner and Contractor
AA. Execution of Contract
BB. Laws and Regulations
CC. Contract Documents and Order of Precedence
DD. Conditions of the Work
EE. Subcontracts
FF. Project Manual/Drawings

1.02 PROJECT DESCRIPTION

A. Project Description: The project includes the construction of a new two-story office building at 818 S. 10th St., Council Bluffs, Iowa 51501. The building is approximately 14,136 SF including forty offices, breakrooms, restrooms, conference rooms, restrooms, mechanical space, and lobby area.

1.03 OWNER

A. State of Iowa, Department of Administrative Services, 109 SE 13th St, Des Moines, IA 50319

1.04 STATE AGENCY REPRESENTATIVES AND CONTACTS

A. PURCHASING AGENT: Michael Bradbury – Issuing Officer, State of Iowa, Department of Administrative Services, Hoover State Office Building, 3rd floor, 1305 East Walnut Street, Des Moines, IA 50319-0105, Phone: 515-823-9327; email: construction.procurement@iowa.gov

B. OWNER REPRESENTATIVE: Jennie Elliott, State of Iowa, Department of Administrative Services, 109 SE 13th Street, Des Moines, IA 50319, Phone: 515-745-3244; email: jennie.elliott@iowa.gov

C. ON-SITE COORDINATOR: Kip Shanks, District Director, State of Iowa, Iowa Department of Corrections, 801 S 10th Street, Council Bluffs, IA 51501, Phone: 712-396-2202; email: kip.shanks@iowa.gov

D. CONSTRUCTION MANAGER CONTACT: Jerry Dehnke, The Samuels Group, 2929 Westown Parkway, Suite 200, West Des Moines, IA 50266, Phone: 515-661-7142; email: jdehnke@samuelsgroup.net

E. DESIGN PROFESSIONAL CONTACT: Anne Nilsson, SVPA Architects Inc, 1466 28th Street, Suite 200, West Des Moines, IA 50266, Phone: 515-327-5990; email: a-nilsson@svpa-architects.com

F. DESIGN PROFESSIONAL CONTACT: Jason Jones, Alvine Engineering, 400 E Court Ave, Ste 130, Des Moines, IA 50309, Phone: 515-243-0569; email: jjones@alvine.com

G. DESIGN PROFESSIONAL CONTACT: Nathan Kress, KPFF Consulting Engineers, 604 Locust St #202, Des Moines, IA 50309, Phone: 515-279-3900; email: nathan.kress@kpff.com

H. DESIGN PROFESSIONAL CONTACT: Elizabeth Hunter, Snyder & Associates, Inc., 231 Bennett Ave, Council Bluffs, IA 51503, Phone: 712-322-3202; email: ehunter@snyder-associates.com

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PROPOSAL FORM AND SUBMISSION

A. A properly prepared and submitted bid is the bidder's responsibility. Bids are to be made in accordance with these Instructions to Bidders and items included on the Bid submission. Failure to comply may be cause for rejection.
B. The Bid is to consist of the required Bid information, together with the other information specified below to be submitted with the Bid, in which copies are included with these Bidding Documents.
    1. The total bid package submitted is required to include the following:
        a. An online submission including:
            1) Required Bid Form (To be uploaded online)
            2) Required Non-discrimination Clause Information
            3) Required Targeted Small Business Pre-bid Contact Information
            4) Bid Security (documentation provided by Bidder) (To be uploaded online) (Required)
            5) Certification of Site Visit (To be uploaded online if Pre-Bid is Mandatory)
C. Include the amount for performing all work described in the drawings and specifications for Base Bid and for each Alternate Bid requested.
D. Acknowledge receipt of all Addenda issued, where so indicated on the Bid Form
E. All required information to be submitted, by an officer of the company having authority to bind the company in a contract.

F. Commencement of the work of the contract shall begin with the Contractor's receipt of a fully executed contract (signed by both parties).
G. The Owner reserves the right to award a contract for Base Bid only, or for Base Bid in combination with any, or all, identified Alternate Bids. The Owner reserves the right to award a contract for individual Bid Packages, or any combination of Bid Packages. Each Bidder must comply with all of the General Requirements of the project and any requirements of the Project manual that apply to their scope of work.
H. The company's Federal I.D. Number and the Iowa Contractors Registration Number shall be included in the Bid Form.
I. Unless indicated otherwise, the Bid shall be for a single responsibility contract for all work as indicated on the Drawings and specified in the Project Manual, and shall be a lump sum amount. If no change in the Base Bid amount is required with respect to consideration of a particular Alternate Bid, enter "No Change" in the blank for that Alternate Bid.
J. Where so requested, provide Unit Prices for the designated types of work and in the units specified, in which the Unit Prices would be used as adjustments to the quantities described in the instructions as the basis for the Base Bid and any Alternate Bid work. A Unit Price would be applicable in the event the Owner should request additional work of that type beyond the extent and quantity that has been established as the scope of the work by graphic delineation and notations on the Drawings, or by otherwise stipulating in the Bidding Documents a numerical quantity of the work, for the Bidder's use in determining the lump sum bid amount for the Base Bid and any requested Alternate Bid containing such work. The Unit Prices shall also be used to adjust the Contract Amount for actual quantities of work involved when the work subject to Unit Price adjustment differs by being less in quantity than that contemplated by the original scope of work for the respective Base Bid or Alternate Bid.
K. Completed State of Iowa Nondiscrimination Clause information and Subcontractor Targeted Small Business Enterprise Pre-Bid Contact Information, included in these Bidding Documents, are to accompany the Bid submission. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa.
L. All Bid information is to be submitted online. Any required Bid Security shall be provided, in the form and amount specified elsewhere in these Instructions to Bidders, at the time of submission of the Bid. When a site visit is mandatory as specified elsewhere in these Instructions to Bidders, and a Certificate of Site Visit is required to be submitted with the Bid as evidence of such visit having occurred for purposes of observing the conditions of the site and the work proposed therein, the Certificate shall be uploaded with the bid submission.

3.02 TAXES

A. In accordance with Section 423 of the Code of Iowa and 701-19 of the Iowa Administrative Rules, Iowa Construction Sales Tax Exemption Certificates for this project will be issued. Do not include Iowa sales tax or use tax, or any local option sales tax, on construction materials in determining your bid prices. The successful Contractor will be required to notify the Department of Administrative Services project manager of all Subcontractors within forty-eight (48) hours after the published date and time by which bids must be submitted. Information on the Contractor and each Subcontractor shall include the firms' name, address, contact person, federal tax identification number, and the Iowa contractor registration number. For the Contractor and each Subcontractor, designate the type of trade or category of work that is to be provided on the project. The Construction Manager for the Department of Administrative Services must be informed when any Subcontractor is added to the project. Following receipt of the information, the Construction Manager for the Department of Administrative Services will arrange to have an authorization letter and certificate (please see sample, included in the Project Manual) issued on behalf of the Contractor and each Subcontractor and will forward the documents to the Contractor for distribution and use by each in purchasing construction materials for this project. Certificates issued for this project shall be used for tax-exempt purchasing construction materials for this project only.

3.03 ALTERNATE BIDS

A. Bidders are to bid all Alternates requested on the Bid Form. Alternates quoted will be reviewed and accepted or rejected at the option of the Department of Administrative Services. Accepted Alternates will be identified in the Owner-Contractor agreement. Indicate the price for Alternates described, as shown on the Drawings and specified in the Project Manual, and identify in the correct location on the Bid Form.

3.04 DRAWINGS AND PROJECT MANUAL

A. Drawings and Project Manual are specified in the Notice to Bidders or any extension thereof made by Addendum.

3.05 BID SECURITY

A. Each Bid shall be accompanied by Bid Security.
B. The Bid Security shall be in the form of a Bid Bond, Certified check, or Cashier's check in an amount not less than five percent (5%) of the maximum value of the Bid, including any additive Alternates. NOTE: Checks other than Certified checks and Cashier's checks will not be accepted. Bonds shall be issued by a bonding company licensed to transact business in the State of Iowa. The Attorney in Fact who signs the Bond shall file with the Bond a certified and effectively dated copy of their Power of Attorney. The Bid Security shall be made payable to the Iowa Department of Administrative Services, and shall accompany the Bid. If a Bid Bond is not used, copies of Certified checks or Cashier's checks must be uploaded and hand delivered, in a sealed envelope, or mailed upon request. The Bid Security shall serve as a guarantee that a Bidder who is offered a contract will enter into an Agreement with the State of Iowa and will file an approved surety company's Performance Bond, Payment Bond and the Insurance Certificates as evidence of the required Insurance prior to execution of the contract. Upon failure to comply, the Bid Security shall be forfeited as liquidated damages. The governmental entity shall retain the bid security furnished by the successful bidder until the approved contract form has been fully executed, a bond has been filed by the bidder guaranteeing the performance of the contract, and the contract and bond have been approved by the governmental entity. The provisions of chapter 573, where applicable, apply to contracts awarded under this chapter. The governmental entity shall promptly return the checks or bidder's bonds of unsuccessful bidders to the bidders once the Notice of Intent to Award is issued.

3.06 DUE DATE AND TIME FOR RECEIPT OF BIDS

A. Properly completed Bids shall be submitted online through IMPACS Electronic Procurement System, no later than the time and date specified in the Notice to Bidder or any extension thereof made by Addendum. Written, emailed, oral or telephonic Bids are invalid, and will not receive consideration. The Bidder shall assume full responsibility for the timely online submission of the Bid. Late bids will not be accepted.

3.07 COMMENCEMENT AND COMPLETION DATES

A. Commencement of the Work of the Contract shall be the day of receipt by the selected Contractor of the fully-executed contract. Final completion of the Work of the contract shall be acknowledged as a part of the Contractor's proposal.

3.08 SITE VISIT

A. A site visit by the prospective bidder is highly recommended at the time of the Pre-Bid Meeting of this project.

3.09 PRE-BID MEETING

A. Pre-Bid Meeting will be specified in the Notice to Bidders or any extension thereof made by Addendum.

3.010 QUESTIONS

A. Questions on this project may be raised and discussed at the time of the Pre-Bid Meeting or by submitting in writing to the issuing officer as specified in the Notice to Bidders or any extension thereof made by Addendum.

3.011 ADDENDA AND INTERPRETATIONS OF THE CONTRACT DOCUMENTS

A. Any person contemplating submitting a proposal for the proposed Contract, who is in doubt as to the true meaning of any part of the Bidding Documents, shall submit a written request for an interpretation thereof. The person submitting a request will be responsible for its prompt delivery. Every request for such interpretation should reference the Bid Number specified in the Bidding Documents, and shall be made in writing (email preferred). Questions shall be submitted to the previously identified Purchasing Agent for the Department of Administrative Services. To be given consideration, requests shall be received as specified in the Notice to Bidders or any extension thereof made by Addendum. Replies, which revise or correct the Bidding Documents, or provide necessary clarifications, will be issued in the form of a written Addendum to the Bidding Documents. Interpretations, corrections or changes of the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon such interpretations, corrections, or changes. The Bidder is to include any resultant cost changes in the Bid Sum. Addenda will be posted electronically at the respective bid site where the bid is initially posted. Acknowledgment by the Bidder of each issued Addendum shall be noted in the location so indicated on the Bid. All Addenda issued shall become part of the Contract Documents.

3.012 SUBSTITUTIONS

A. Where the Bidding Documents stipulate a specific product be provided by naming one or more manufacturer and model, a substitute product will be considered when a written request is received as specified in the Notice to Bidders or any extension thereof made by Addendum prior to bid opening. Substitution requests will be considered for all products per Section 01 2500 Substitution Procedures, even if the specification does not include a statement such as “or equal,” “equal to,” “equivalent to,” or “basis of design,” unless otherwise noted. Substitution requests shall be emailed to the Issuing Officer at the email address provided in Instructions to Bidders Section 1.04.

3.013 OBLIGATION OF BIDDER

A. It shall be the responsibility of each Bidder contemplating the submission of a Bid for the proposed Contract to fully acquaint himself/herself with conditions at the work site, project requirements, and to become acquainted thoroughly with the work, and all conditions that may be related to it. No considerations or revision in the contract price or scope of the project will be considered by the Owner for any item that could have been revealed by a thorough on-site inspection and examination.
B. By submission of a Bid, it shall be understood that the Bidder assures that he/she has reviewed and is thoroughly familiar with the project requirements, contract conditions and supplementary conditions, the drawings, specifications, addenda, and that the bidder is aware of the conditions existing at the site that may relate to the work of this project. Failure of any Bidder to examine any form, document, or other instrument shall in no way relieve the Bidder from any obligation in respect to his/her Bid.

3.014 PUBLIC RECORDS AND REQUESTS FOR CONFIDENTIAL TREATMENT

A. The Agency's release of public records is governed by Iowa Code chapter 22. Contractors are encouraged to familiarize themselves with Chapter 22 before submitting a Proposal. The Agency will copy and produce public records upon request as required to comply with Chapter 22 and will treat all information submitted by a Contractor as non-confidential records unless Contractor requests specific parts of the Proposal be treated as confidential at the time of the submission as set forth herein AND the information is confidential under Iowa or other applicable law.
B. A Contractor requesting confidential treatment of specific information must: (1) fully complete Form 22 (Available at https://das.iowa.gov/sites/default/files/procurement/pdf/Form%2022-ConfidentialityRequest-RFB.pdf), (2) identify the request in the transmittal letter with the Contractor's Proposal, (3) conspicuously mark the outside of its Proposal as containing confidential information, (4) mark each page upon which confidential information appears, and (5) submit a "Public Copy" from which the confidential information has been excised.
C. Form 22 will not be considered fully complete unless, for each confidentiality request, the Contractor: (1) enumerates the specific grounds in Iowa Code chapter 22 or other applicable law that supports treatment of the material as confidential, (2) justifies why the material should be maintained in confidence, (3) explains why disclosure of the material would not be in the best interest of the public, and (4) sets forth the name, address, telephone, and e-mail for the person authorized by Contractor to respond to inquiries by the Agency concerning the confidential status of such material.
D. The Public Copy from which confidential information has been excised is in addition to the number of copies requested in Section 3 of this RFP. The confidential material must be excised in such a way as to allow the public to determine the general nature of the material removed and to retain as much of the Proposal as possible.
E. **Failure to request information be treated as confidential as specified herein shall relieve Agency and State personnel from any responsibility for maintaining the information in confidence. Contractors may not request confidential treatment with respect to pricing information and transmittal letters. A contractor's request for confidentiality that does not comply with this section or a contractor's request for confidentiality on information or material that cannot be held in confidence as set forth herein are grounds for rejecting contractor's Proposal as non-responsive. Requests to maintain an entire Proposal as confidential will be rejected as non-responsive.**
F. If Agency receives a request for information that Contractor has marked as confidential and if a judicial or administrative proceeding is initiated to compel the release of such material, Contractor shall, at its sole expense, appear in such action and defend its request for confidentiality. If Contractor fails to do so, Agency may release the information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction. Additionally, if Contractor fails to comply with the request process set forth herein, if Contractor's request for confidentiality is unreasonable, or if Contractor rescinds its request for confidential treatment, Agency may release such information or material with or without providing advance notice to Contractor and with or without affording Contractor the opportunity to obtain an order restraining its release from a court possessing competent jurisdiction.

3.015 WITHDRAWAL OF BID

A. A Bid may be modified or withdrawn only before the time and date for receipt of Bids. Said request for modification or withdrawal of a bid must be completed online through IMPACS Electronic Procurement System. A Bid shall remain valid for consideration by the Owner for the following period(s) of time after the date specified for receipt of Bids, or until such time following that period that the apparent low bidder requests in writing that the Bid be withdrawn, after which the Bid may be withdrawn without forfeiture of any required Bid Security. The Bid shall be valid for not less than thirty (30) calendar days after the date Bids are specified to be due. With the

approval of the Department of Administrative Services, a bid may be withdrawn after opening, but only if the bidder provides prompt written notification that adequately documents the commission of an honest error that may cause undue financial loss.

3.016 BID OPENING

A. All bids received on or before the due date and time specified in the Notice to Bidder or any extension thereof made by Addendum will be opened and the name of the Bidder and the amount of their Bid will be announced.

3.017 BASIS OF BIDS

A. The Bidder shall include all additional documents or appendices that are requested to be submitted concurrent with the Bid submission; failure to comply may be cause for rejection.
B. In accordance with Iowa law, Section 8A.311: A bidder, to be considered for an award of a state construction contract, shall disclose to the state agency awarding the contract the names of all subcontractors and suppliers who will work on the project being bid, within forty-eight (48) hours after the published date and time by which bids must be submitted. A bidder shall not replace a subcontractor or supplier disclosed without the approval of the state agency awarding the contract.
    1. A bidder, prior to an award or who is awarded a state construction contract, shall disclose all of the following, as applicable:
        a. If a subcontractor or supplier disclosed (under the preceding) by a bidder is replaced, the reason for replacement and the name of the new subcontractor or supplier;
        b. If the cost of work to be done by a subcontractor or supplier is changed or if the replacement of a subcontractor or supplier results in a change in the cost, the amount of the change in cost.
        c. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.
C. The Bidder is specifically advised that any person, firm or other party to whom it is proposed to award a subcontract under this contract must:
    1. Be registered in the State of Iowa and have an Iowa Contractor's Registration number, and
    2. Be acceptable to the Owner.

3.018 INFORMALITIES/ REJECTION OF BIDS

A. The Iowa Department of Administrative Services reserves the right to waive any irregularities or informalities and to enter into a Contract with a Bidder, or to reject any or all bids as it deems to be in the best interest of the State, without penalty.

3.019 CONSIDERATION OF BIDS

A. It is the intent of the Department of Administrative Services to award a Contract to the lowest responsible Bidder, provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and is determined to be compliant with all Bidding Requirements, and does not exceed the funds available for construction.
B. Bidder is to bid on each Alternate Bid requested. Failure to do so may result in disqualification of the bid. The Department of Administrative Services reserves the right to accept any, or no, Alternate Bid. Alternate Bids may be considered in any order or combination, and the low successful Bidder will be determined on the basis of the sum of the Base Bid and the Alternate(s) accepted at the time of the Contract award.
C. In evaluating Bids, any proposal offered by a Bidder for an alternate design, or for materials other than those shown or specified for the Base Bid or for Alternate Bid construction under the

proposed Construction Documents or called for by any issued Addenda to those Construction Documents, will not be considered in determining the low successful Bidder. However, the Department of Administrative Services reserves the right to consider any such Bidder-proposed (Contractor's Alternate) alternate designs or materials with the low successful Bidder, after the low successful Bidder is determined in the manner described above (A and B).

D. Notice of Intent to Award the Bid(s) will be sent to all Respondents submitting a timely Bid and may be posted at the website shown on the RFB cover sheet. Negotiation and execution of the Contract(s) shall be completed no later than fifteen (15) days from the date of the Notice of Intent to Award or such other time as designated by Agency. If the successful Bidder fails to negotiate and deliver an executed Contract, including all required documents such as payment and performance bonds and insurance certificate, by that date, the Agency, in its sole discretion, may cancel the award and award the Contract to the remaining Bidder the Agency believes will provide the best value to the State.

3.020 PREFERENCE

A. By virtue of statutory authority, a preference shall be given to Iowa domestic labor, products produced and provisions grown within the state of Iowa, in accordance with the provisions of Chapter 73, Code of Iowa and any amendments thereto.

B. Enforcement of reciprocal resident bidder preference and resident labor force preference codified at Iowa Code Section 73A.21.

1. NOTICE: Failure on the part of the bidder to carefully read the following paragraphs and to provide the information requested below may make the bidder's bid materially nonresponsive and therefore ineligible for contract award. Violations of Iowa Code Section 73A.2l may, among other things, result in civil penalties assessed by the Commissioner of the Division of Labor of Iowa Workforce Development. The bidder should seek out the advice of an attorney if he or she has questions about Iowa Code Section 73A.21. As a part of the competitive procurement of contracts for Public Improvements that must be awarded to the low bidder (if the bid is responsive and the bidder is deemed responsible), Public Bodies shall allow a preference to Resident Bidders if a Nonresident Bidder places a bid for the contract for the Public Improvement and that Nonresident Bidder's state or foreign country gives resident bidders of that state or foreign country a preference (including a labor force preference or any type of preferential treatment). The preference allowed, or reciprocally applied, shall be equal to the preference given or required by the state or foreign country in which the Nonresident Bidder is a resident bidder.
   "Public Body" means the State of Iowa (and its agencies) and any of its political subdivisions, including school districts, public utilities, and the state board of regents.
   "Public Improvement" means a building or other construction work to be paid for in whole or in part by the use of funds of the State of Iowa, its agencies, and any of its political subdivisions and includes road construction, reconstruction, and maintenance projects.
   "Resident Bidder" means a person or entity authorized to transact business in of the State of Iowa and having a place of business for transacting business within the State of Iowa at which it is conducting and has conducted business for at least three years prior to the date of the first advertisement for the public improvement. Note, however, that if a nonresident bidder's state or foreign country has a more stringent definition of a resident bidder, the more stringent definition is applicable as to bidders from that state or foreign country.
   "Nonresident Bidder" means a person or entity who does not meet the definition of a resident bidder.

C. Nonresident bidders shall be required to certify on the Bid submission, where so indicated, the state or foreign country in which the firm is a resident, and if that state or foreign country uses a percentage for in-state bidders and the amount of the preference.

D. If it is determined that this may cause denial of federal funds which would otherwise be available, or would otherwise be inconsistent with requirements of federal law, this section shall be

suspended, but only to the extent necessary to prevent denial of the funds or to eliminate the inconsistency with federal requirements.

3.021 QUALIFICATIONS

A. In accordance with Iowa Code 26.9(2) and 26.16, no potential bidder shall be required to provide confidential or proprietary information or meet any class requirements as a precondition to submitting a responsive bid. However, as noted in Iowa Code 26.9(2), the lowest responsive bidder may be required to provide additional information to verify responsibility prior to and as a condition of obtaining final award of the contract. Any qualification requirements contained in any bid document indicates only preferred qualifications, not a precondition to bid, and the lowest responsive bidder's qualifications will be evaluated individually based on all information provided.
B. The Owner may make such investigations as he or she deems necessary to determine the ability of the awarded Bidder to perform the required work, and the awarded Bidder shall furnish to the Owner all such information and data for this purpose. The Owner reserves the right to rescind any awarded Bid if the evidence submitted by, or in investigation of, such Bidder fails to satisfy the Owner that the Bidder is properly qualified to carry-out the obligations of the Contract and to complete the Work contemplated therein.
C. Bidders shall be registered as a Construction Contractor with the Labor Commissioner, Iowa Workforce Development Department, as required by Chapter 91C of the Code of Iowa. Bidder's Iowa Contractor Registration Number shall be included in the location provided in the Bid Form.
D. Non-resident corporations submitting bids must be in compliance with Section 490.1501 of the Code of Iowa and legally authorized thereby to carry-on such business in the State of Iowa as is required by the Contract Documents.
E. An out-of-state Bidder, if awarded a contract, will be required to submit evidence of authorization to do business in the State of Iowa.

3.022 INSURANCE

A. Insurance Requirements
   1. The Contractor shall maintain in effect, with insurance companies of recognized responsibility, at its expense, insurance covering its work of the type and in amounts required by this Contract. The Contractor's insurance shall, among other things, insure against any loss or damage resulting from the Contractor's performance of this Contract. All such insurance policies shall remain in full force and effect for the entire life of this Contract and shall not be canceled or changed except after thirty (30) days written notice to the Owner.
   2. **Amounts of Insurance Required – Refer to ConsensusDOCS 802 (see template in Project Manual)**
B. Certificates of Coverage
   1. Certificates of the insurance described above shall be submitted to the Owner before starting any construction activities and shall be subject to approval by the Owner. The Contractor shall provide certificates for the insurance required. The insurer shall state in the certificate that no cancellation of the insurance will be made without at least thirty (30) days prior written notice to the Contractor. Upon receipt of any notice of cancellation or alteration, Contractor shall within ten (10) days procure other policies of insurance, similar in all respects to the policy or policies, about to be canceled or altered, and, if the Contractor fails to provide, procure, and deliver acceptable policies of insurance, or satisfactory evidence thereof, in accordance with the terms hereof then, at the Owner's option, Owner may obtain such insurance at the cost and expense of Contractor, without the need of any notice to Contractor.
C. No Limitation of Liability
   1. Acceptance of the insurance certificates by the Owner shall not act to relieve the Contractor of any obligation under this Contract. All insurance policies and certificates shall be issued only by companies authorized to transact business in the State of Iowa. It shall be the

responsibility of the Contractor to keep the respective insurance policies and coverage's current and in force during the life of this agreement.

2. A Sample Certificate of Insurance is attached for reference following this Section.

3.023 FORM OF AGREEMENT BETWEEN OWNER AND CONTRACTOR

A. The Agreement for the Work will be written on ConsensusDOCS 802 Form of Agreement between Owner and Contractor (sample of the document with modifications incorporated is bound in this Project Manual).

3.024 EXECUTION OF CONTRACT

A. Contract documents shall mean and include the following:
   1. Contract: ConsensusDOCS 802
   2. Performance and Payment Bonds
   3. Project Manual
   4. Drawings
   5. Numbered Addenda issued after initial publication of Bid Documents
   6. Numbered Modifications (Change Orders) issued after Contract is signed

3.025 LAWS AND REGULATIONS

A. The Bidder's attention is directed to the fact that all applicable laws and regulations of Federal and State agencies having jurisdiction over the construction of this project shall apply to any contract resulting from this proposal, and it shall be deemed that those rules and regulations are made a part of such contract the same as if set forth in their entirety therein. By submitting a Bid, the Bidder confirms that he/she is familiar with and understands the Contractor's responsibility under all Federal and State of Iowa laws and regulations with respect to the Work described by the proposed Contract Documents.

3.026 CONTRACT DOCUMENTS AND ORDER OF PRECEDENCE

A. Where an irreconcilable conflict exists among Applicable Legal Requirements, this Contract, the specifications in the Materials and the Drawings, the earliest item mentioned in this sentence involving a conflict shall control over any later mentioned item or items subject to such conflict unless doing so would result in reducing the Bidder's duty of care or obligations under this Contract, in which case the terms resulting in the highest requirements for Bidder performance shall control.

3.027 CONDITIONS OF THE WORK

A. Each bidder must fully inform him/herself of the conditions under which the work is to be performed at the site of the work, the obstacles which may be encountered, and all other relevant matters concerning the work to be performed. Failure to do so will not relieve a successful bidder of the obligation to furnish all material and labor necessary to carry out the provisions of the contract. When a site visit is required by provisions located elsewhere in these Instructions to Bidders, as a site tour in conjunction with a mandatory Pre-Bid Meeting, it shall be the Bidder's responsibility to fulfill this obligation as a condition of bidding the Work described in the Bidding Documents.

B. No allowance will be made for any additional compensation by reason of any matter or condition with which the bidder might have fully informed him/herself, but failed to do so prior to bidding. Insofar as possible, the Contractor and all subcontractors shall employ such methods or means in carrying out the work so as not to cause any interruption of, or interference with, the work of any other subcontractor or trade.

3.028 SUBCONTRACTS

A. The Prime Contractor shall be responsible for notifying all subcontractors and suppliers and informing them that they are bound in each case by all applicable provisions of the bidding information and those of the proposed Form of Agreements as defined in the Contract Documents.

END OF SECTION

SECTION 00 2113.01

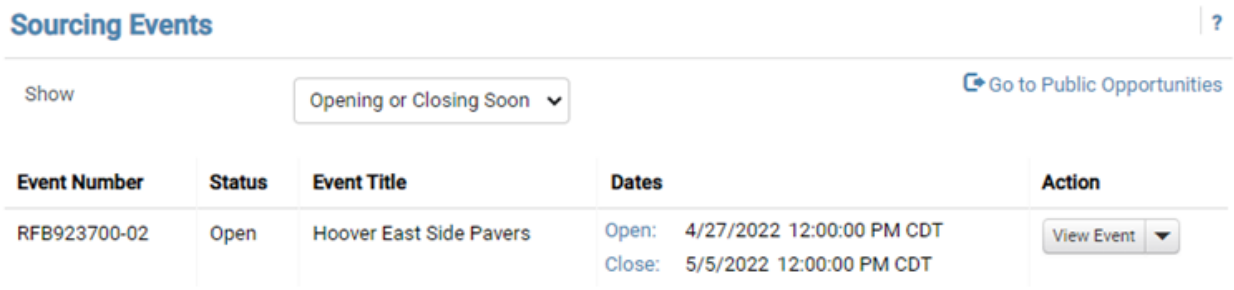
IMPACS Public Construction Bidders User Guide

Public construction bids must be submitted on-line at IMPACS Electronic Procurement System.

Bidders must be registered in IMPACS to submit a Bid.

To create an account, enter your email address and click on "Next" and click "Create Account". Bidder must enter all fields noted with * including legal company name, contact first and last name, phone number, confirm email address, password, re-enter password, select account recovery question including answer, confirm answer, select box accepting websites use terms and conditions and select security check box "I'm not a robot".

On the IMPACS Electronic Procurement System Customer Portal Home page, Bidder selects "View Event" in the Sourcing Events section.



Bidders can view event details including description, prerequisites, buyer attachments, questions and answers.

To submit a Bid, Bidder must select **"Yes, I intend to Bid"**. Bidder must complete the following sections.

Prerequisites - Bidder must complete all prerequisites.

- Bidder must upload a file of the Bid Security/Bond for 5% of total Bid Amount and certify that if they are awarded the construction contract they will enter into the contract at the Bid Amount submitted.

- Bidder must upload the completed and signed Bid Form.
  NOTE: Bids are to be entered on the Bid Form only; not in the IMPACS. As a result, IMPACS will display a bid amount of $0.

Questions - Bidder must complete all questions.

Review & Submit - Bidder must select the certification box certifying that the statements and information in response are true and correct to the best of their knowledge and belief.

SECTION 00 2113.02

SAMPLE

ACORD

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) xx/xx/xxxx

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME: Agent's Information	
Agent's Name Agent's Address	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A : Company A(AM Best Rated A/VI or Better)	Admitted
INSURED	INSURER B :	Carriers
Trade Contractor's Name Trade Contractor's Mailing Address	INSURER C :	
	INSURER D :	
	INSURER E :	
	INSURER F :	

COVERAGES CERTIFICATE NUMBER: REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS Minimum	
* A	COMMERCIAL GENERAL LIABILITY CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: POLICY [X] PRO-JECT [ ] LOC OTHER:	X	X	#TBD- CGL	3/1/17	3/1/18	EACH OCCURRENCE	$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$
							MED EXP (Any one person)	$
							PERSONAL & ADV INJURY	$1,000,000
							GENERAL AGGREGATE	$2,000,000
							PRODUCTS - COMP/OP AGG	$1,000,000
								$
B	AUTOMOBILE LIABILITY [X] ANY AUTO ALL OWNED AUTOS HIRED AUTOS SCHEDULED AUTOS NON-OWNED AUTOS	X	X	#TBD-AL	3/1/17	3/1/18	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	amount varies based on paragraph 10.2.2 of the ConsensusDocs 602 contract
							PROPERTY DAMAGE (Per accident)	$
								$
C	UMBRELLA LIAB [X] OCCUR EXCESS LIAB CLAIMS-MADE DED RETENTION $	X	X	#TBD-UMB	3/1/17	3/1/18	EACH OCCURRENCE	$10,000,000
							AGGREGATE	$
								$
D	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N [ ] (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A	X	#TBD-WC	3/1/17	3/1/18	[X] PER STATUTE [ ] OTH-ER	
							E.L. EACH ACCIDENT	$500,000
							E.L. DISEASE - EA EMPLOYEE	$500,000
							E.L. DISEASE - POLICY LIMIT	$500,000
* E	Owners Contrators Protective Liability			#TBD-OCP	3/1/17	3/1/18	*Limits equal to CGL (or) as required by owner (Note- Would be either CGL or OCP, not both)	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Additional Insured on a Primary & Non-Contributory basis (CGL;AL;UMB/Excess) in favor of : (Owner) Iowa Department of Administrative Services (DAS), Officers, Directors, Members, Consultants, Agents, and Employees.
Waiver of Subrogation (CGL;AL;WC/EL;UMB/Excess) in favor of: (Owner) Iowa Department of Administrative Services (DAS), Officers, Directors, Members, Consultants, Agents, and Employees.

Project XXXX.XX (Number varies by project)

CERTIFICATE HOLDER	CANCELLATION
Iowa Department of Administrative Services (DAS) 109 SE 13th Street Des Moines, IA 50319	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE Signature

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SECTION 00 3113

PRELIMINARY SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Preliminary Construction Schedule
B. Schedule Durations

1.02 PRELIMINARY SCHEDULE

A. A preliminary schedule has been identified by the Owner for the implementation of the Project. Refer to the schedule following this Section for references to anticipated milestones and construction duration.
B. Each step of the Preliminary Schedule is subject to receipt of acceptable bids, Owner's decision process and date of commencement.
C. A proposed construction schedule shall be submitted by all Trade Contractors to the Construction Manager no later than 48 hours prior to the pre-construction meeting. A revised Construction Schedule will be submitted by the Construction Manager once all preliminary schedules are reviewed and approved by the Owner.
D. The final construction schedule will be established post award of bids with the cooperation of all contractors.

1.03 SCHEDULE DURATIONS

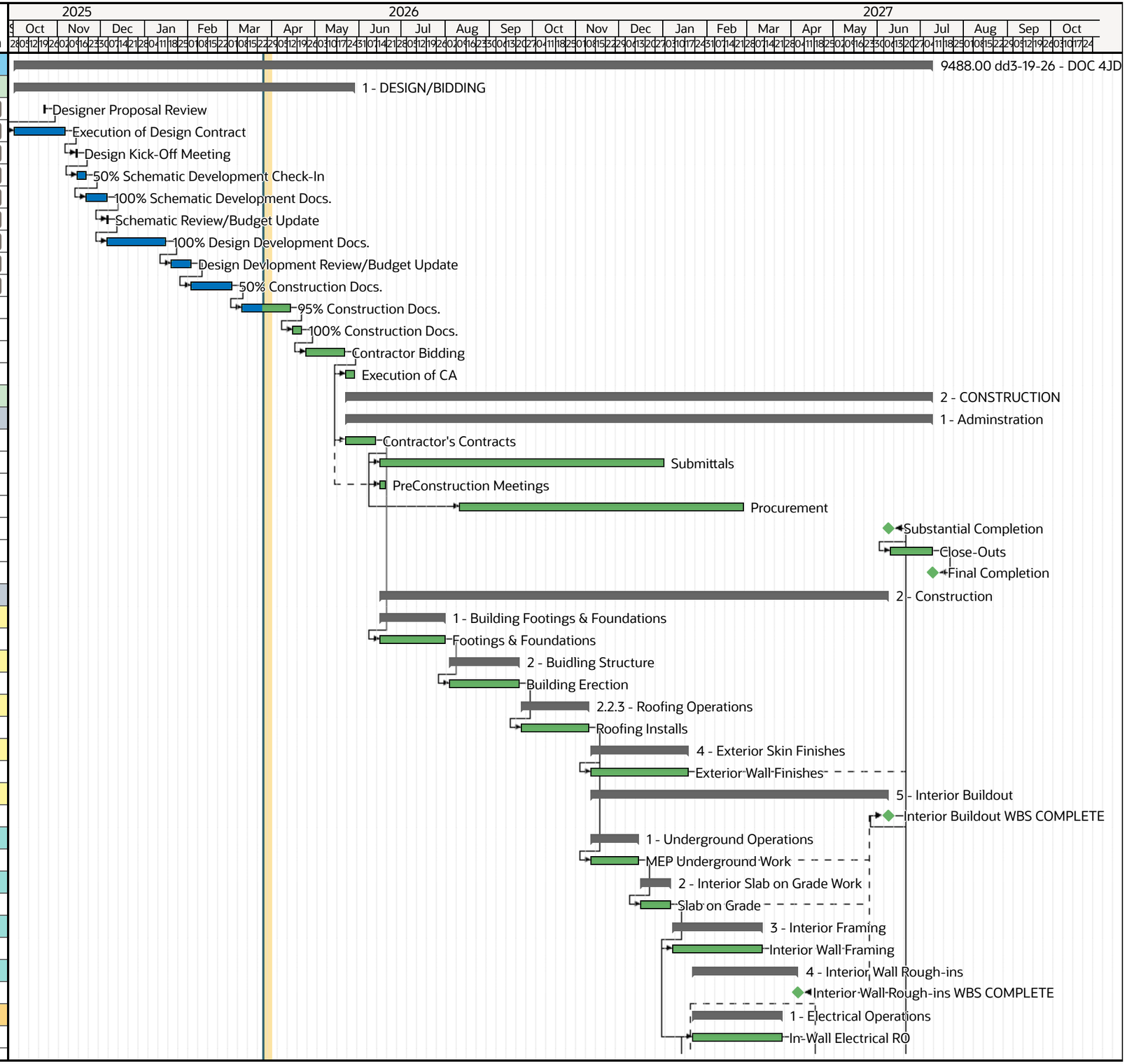
A. Anticipated Notice of Intent to Award – 05/22/2026
B. Anticipated Date of Commencement – 06/05/2026
C. Substantial Completion by – 06/18/2027

PART 2 - PRODUCTS – NOT USED

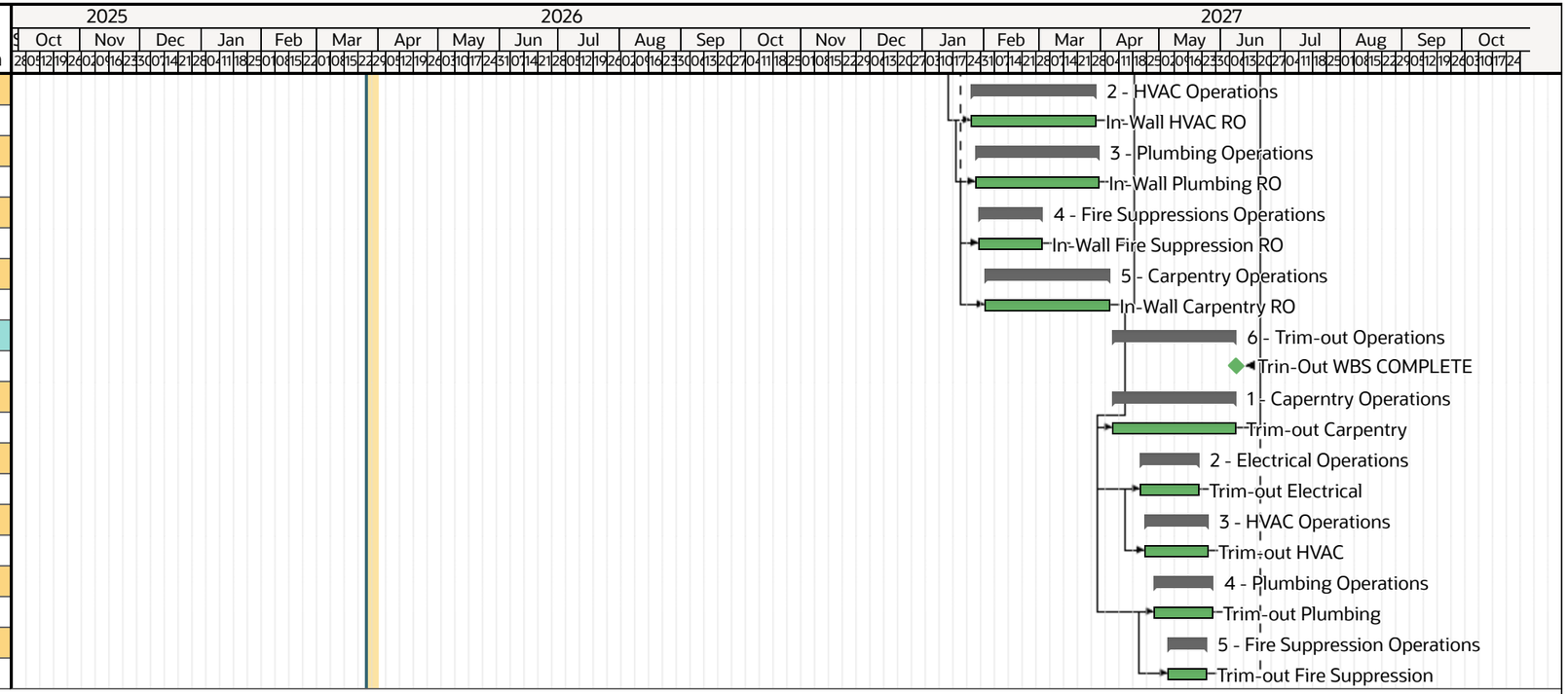
PART 3 - EXECUTION – NOT USED

END OF SECTION

Name	Planned Duration	Planned Start	Finish
DOC 4JD CB New Central Office Bui...	451d	01-Oct-25	09-Jul-27
DESIGN/BIDDING	165d	01-Oct-25	28-May-26
Designer Proposal Review	2d	01-Oct-25	22-Oct-25 A
Execution of Design Contract	27d	01-Oct-25	06-Nov-25 A
Design Kick-Off Meeting	1d	13-Nov-25	13-Nov-25 A
50% Schematic Development Ch...	5d	14-Nov-25	20-Nov-25 A
100% Schematic Development D...	10d	20-Nov-25	05-Dec-25 A
Schematic Review/Budget Update	1d	05-Dec-25	05-Dec-25 A
100% Design Development Docs.	28d	05-Dec-25	16-Jan-26 A
Design Devlopment Review/Bud...	10d	19-Jan-26	02-Feb-26 A
50% Construction Docs.	26d	02-Feb-26	03-Mar-26 A
95% Construction Docs.	19d	10-Mar-26	13-Apr-26
100% Construction Docs.	6d	14-Apr-26	21-Apr-26
Contractor Bidding	20d	24-Apr-26	21-May-26
Execution of CA	4d	22-May-26	28-May-26
CONSTRUCTION	290d	22-May-26	09-Jul-27
Adminstration	290d	22-May-26	09-Jul-27
Contractor's Contracts	15d	22-May-26	12-Jun-26
Submittals	140d	15-Jun-26	01-Jan-27
PreConstruction Meetings	5d	15-Jun-26	19-Jun-26
Procurement	140d	10-Aug-26	26-Feb-27
Substantial Completion	0d		08-Jun-27
Close-Outs	23d	09-Jun-27	09-Jul-27
Final Completion	0d		09-Jul-27
Construction	252d	15-Jun-26	08-Jun-27
Building Footings & Foundations	35d	15-Jun-26	31-Jul-26
Footings & Foundations	35d	15-Jun-26	31-Jul-26
Buidling Structure	35d	03-Aug-26	21-Sep-26
Building Erection	35d	03-Aug-26	21-Sep-26
Roofing Operations	35d	22-Sep-26	09-Nov-26
Roofing Installs	35d	22-Sep-26	09-Nov-26
Exterior Skin Finishes	46d	10-Nov-26	18-Jan-27
Exterior Wall Finishes	46d	10-Nov-26	18-Jan-27
Interior Buildout	147d	10-Nov-26	08-Jun-27
Interior Buildout WBS COMPL...	0d		08-Jun-27
Underground Operations	23d	10-Nov-26	14-Dec-26
MEP Underground Work	23d	10-Nov-26	14-Dec-26
Interior Slab on Grade Work	15d	15-Dec-26	06-Jan-27
Slab on Grade	15d	15-Dec-26	06-Jan-27
Interior Framing	46d	07-Jan-27	11-Mar-27
Interior Wall Framing	46d	07-Jan-27	11-Mar-27
Interior Wall Rough-ins	53d	21-Jan-27	05-Apr-27
Interior Wall Rough-ins WBS ...	0d		05-Apr-27
Electrical Operations	46d	21-Jan-27	25-Mar-27
In-Wall Electrical RO	46d	21-Jan-27	25-Mar-27



Name	Planned Duration	Planned Start	Finish
HVAC Operations	46d	25-Jan-27	29-Mar-27
In-Wall HVAC RO	46d	25-Jan-27	29-Mar-27
Plumbing Operations	46d	27-Jan-27	31-Mar-27
In-Wall Plumbing RO	46d	27-Jan-27	31-Mar-27
Fire Suppressions Operations	23d	29-Jan-27	02-Mar-27
In-Wall Fire Suppression RO	23d	29-Jan-27	02-Mar-27
Carpentry Operations	46d	01-Feb-27	05-Apr-27
In-Wall Carpentry RO	46d	01-Feb-27	05-Apr-27
Trim-out Operations	46d	06-Apr-27	08-Jun-27
Trin-Out WBS COMPLETE	0d		08-Jun-27
Caperntry Operations	46d	06-Apr-27	08-Jun-27
Trim-out Carpentry	46d	06-Apr-27	08-Jun-27
Electrical Operations	23d	20-Apr-27	20-May-27
Trim-out Electrical	23d	20-Apr-27	20-May-27
HVAC Operations	23d	23-Apr-27	25-May-27
Trim-out HVAC	23d	23-Apr-27	25-May-27
Plumbing Operations	23d	27-Apr-27	27-May-27
Trim-out Plumbing	23d	27-Apr-27	27-May-27
Fire Suppression Operations	15d	04-May-27	24-May-27
Trim-out Fire Suppression	15d	04-May-27	24-May-27



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SECTION 00 3132

GEOTECHNICAL DATA

PART 1 - GENERAL

1.01 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.

B. A geotechnical investigation report for Project, titled Geotechnical Engineering Report, Central Office Building – Council Bluffs, IA, ISG-TEAM No. 71-79, prepared by ISG-TEAM Inc., dated January 23, 2026, **is available for viewing as appended to this Document.**

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 00 3143

PERMIT APPLICATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Permit Application Information
B. Licenses, Permits, and Related Inspections

1.02 PERMIT APPLICATION INFORMATION

A. State Building Code Plan Review: The plan review and inspections for this project have been applied for by the Architect. Please contact your inspector prior to construction and occupancy.
B. State Building Code Energy Review: The energy code review and inspections for this project have been applied for by the Architect. Please contact your inspector prior to construction and occupancy.
C. Water Heater Permit and Inspections: Trade Contractor is responsible for permits and inspections.
D. Electrical Permit and Inspections: Trade Contractor is responsible for permits and inspections.
E. Elevator Permit and Inspections: Trade Contractor is responsible for permits and inspections.
F. Other Applicable inspections: Trade Contractor is responsible for any other applicable project specific permits and inspections.

1.03 LICENSES, PERMITS, AND RELATED INSPECTIONS

A. The Bidder shall comply with all codes, laws, ordinances, rules and regulations of any public authority having jurisdiction that bears on the performance of its work. All construction, materials and methods shall comply with the State Building Codes, except where plans and specifications establish a higher standard.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

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SECTION 00 4116

BID FORM

The Bid Form must be submitted online through the State's IMPACS Electronic Procurement System.

RFB #948800-01

BID FORM for CONSTRUCTION CONTRACT
for
Department of Corrections
818 S. 10th St., Council Bluffs, Iowa
Project 9488.00

Iowa Department of Administrative Services
Hoover State Office Building, Level 3
1305 East Walnut Street
Des Moines, Iowa 50319-0105

The following information is to be completed and submitted with your bid..

1. Bid Form - Completed and Signed (to be uploaded with bid submission)
2. Non-Discrimination Clause Information
3. Contractor Targeted Small Business Enterprise Pre-Bid Contract Information
4. Bid Security – 5% of total Bid amount (to be uploaded with bid submission)

Authorized Representative:
The undersigned Bidder, in response to your Request for Bid for construction of the above project, having examined the Drawings, Specifications, and other Bidding Documents dated **April 21, 2026**, and Addenda issued and acknowledged below as received and being familiar with all the conditions surrounding the construction of the proposed project including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies to perform all work to construct the project in strict accordance with the proposed Contract Documents, within the time and at the prices stated below. Prices are to cover all expenses incurred in performing the work required under the proposed Contract Documents, of which this bid is a part.

Bidder acknowledges receipt of the following Addenda which are a part of the Bidding Documents and for which any effect on cost of the Work is included in the bid amounts indicated:

Number _____ _____ _____ _____ _____

Dated _____ _____ _____ _____ _____

Note that the State of Iowa is exempt from State and Local sales and use taxes (including local option and school option) for this project. Taxes on construction materials shall NOT be included in the bid amounts.

Amounts shall be indicated in both words and figures. In case of discrepancy, the amount indicated in words shall govern.

BID PACKAGES:

BP 01

Description: General Construction

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

BP 02

Description: Roofing

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

BP 03

Description: Conveying Systems (Hydraulic Elevator):

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

BP 04

Description: Fire Suppression

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

BP 05

Description: HVAC - Plumbing

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

BP 06

Description: Electrical – Communications - Elect. Safety/Security

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

ALTERNATES:

ALT 01

Description: Fiber Cement Lap Siding (LP-01) in lieu of Fiber Cement Panel Board (LP-02)

Bidder proposes and agrees to perform all work as described in the Construction Documents for the sum of:

_____

_____ Dollars

($_____).

UNIT PRICES:

UNIT 01

Description: Additional Over-Excavation (One Cubic Yard)

_____

_____ Dollars

($_____).

Bidder hereby certifies that:

1. This bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm or corporation;
2. Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid; Bidder has not solicited or induced any person, firm or corporation to refrain from bidding; and Bidder has not sought by collusion to obtain any advantage over any other bidder or over the Owner.
3. Bidder hereby certifies that the Bidder is registered with the Iowa Labor Commissioner as a Contractor as required by Chapter 91C, Code of Iowa.
4. Bidder agrees to comply with all Federal and State Affirmative Action/Equal Employment Opportunity requirements concerning fair employment and will not discriminate between or among them by reason of race, color, religion, sex, national origin or physical handicap.
5. All construction under this Contract shall conform to the requirements of the *Iowa State Building Code*.
6. Bidder agrees that this bid shall remain valid and shall not be withdrawn for a period of thirty (30) calendar days after the date for receipt of bids.
7. Bidder agrees that if written notice of acceptance of this bid is mailed, emailed, or delivered to the undersigned within thirty (30) days after the date in which bids are due, or at any time thereafter before it is withdrawn, the undersigned will sign and return the Contract Agreement, prepared in accord with the Bidding Documents and this bid as accepted; and will also provide proof of insurance coverage and required surety bonds.
8. Bidder understands that the Owner reserves the right to reject any and all bids, and to waive irregularities or informalities and enter into a contract for the work, as the Owner deems to be in the best interest of the State.
9. Bidder understands that the Owner reserves the right to accept any, or no, Alternate Bid, if requested, and that the Alternate Bids may be considered in any order or combination, and the low Bidder shall be determined on the basis of the sum of the base bid and any Alternate(s) accepted.

Subcontractors:
The Trade Contractor must identify all Subcontractors and Suppliers within 48 hours of the published date and time for which bids must be submitted, in accordance with Iowa Code Section 8A311, as amended by House File 646 in 2011. Subcontractors and suppliers may not be changed without the approval of the Owner. Requests for changing a Subcontractor or supplier must identify the reason for the proposed change, the name of the new Subcontractor or supplier, and the change in the subcontractor or supplier price as a result of the change. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract Price via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

Enforcement of Reciprocal Resident Bidder Preference, per Iowa Code 73A.21.

All bidders shall either check the box next to “Resident Bidder” or check the box next to “Nonresident Bidder” and by doing so and signing thereafter certifies and attests to the same. All information requested must be provided. Seek out the advice of an attorney if you have questions.

“Resident Bidder” means a person or entity authorized to transact business in of the State of Iowa and having a place of business for transacting business within the State of Iowa at which it is conducting and has conducted business for at least three years prior to the date of the first advertisement for the public improvement. Note, however, that if a nonresident bidder’s state or foreign country has a more stringent definition of a resident bidder, the more stringent definition is applicable as to bidders from that state or foreign country.

☐ Resident Bidder

Name of Resident Bidder: _____

By: _____
Authorized Agent and Signatory of Resident Bidder

OR:

☐ Nonresident Bidder

Name of Nonresident Bidder: _____

Name of State or Foreign Country of Nonresident Bidder: _____

Particularly identify and describe any preference, labor preference, or any other type of preferential treatment, in effect in the nonresident bidder's state or foreign country at the time of this bid:

_____
_____
_____

NOTICE: Nonresident Bidders domiciled in a state or country with a resident labor force preference shall make and keep, for a period of not less than three years, accurate records of all workers employed on the public improvement. The records shall include each worker's name, address, telephone number when available, social security number, trade classification, and the starting ending time of employment.

By: _____
Authorized Agent and Signatory of Nonresident Bidder

REQUIRED: Bid Form shall be signed by an officer of the company with authority to bind in a contract. Notice of acceptance of this bid, or request for additional information by the Department of Administrative Services, may be addressed to the undersigned at the address set forth below:

Legal Name of Firm: _____

Date: _____

Signature of Bidder: _____

Title: _____

Typed Name of Signatory: _____

Email: _____

Business Address:

_____
_____
_____

Telephone Number: _____ Fax Number: _____

Federal Tax Identification Number: _____

Iowa Contractor Registration Number: _____

Bidder Safety Manager Name:_____

For an out-of-state Bidder, Bidder certifies that the Resident Preference given by the State or

Foreign Country of Bidder's residence, _____, is _____ %.

END OF SECTION

SECTION 00 4116.01

NON-DISCRIMINATION CLAUSE

This Section is for informational purposes only. All information will be submitted online through the State's IMPACS Electronic Procurement System.

PART 1 - GENERAL

All contractors, subcontractors, vendors and suppliers of goods and services doing business with the State of Iowa and value of said business equals or exceeds $10,000 annually, agree as stated below.

1.01 NONDISCRIMINATION CLAUSE

A. The contractor, subcontractor, vendor and supplier of goods and services will not discriminate against an employee or applicant for employment because of race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinion, or affiliations of an applicant or employee based upon the nature of the job occupation. The contractor, subcontractor, vendor and supplier will develop an Affirmative Action Program to insure that applicants are employed and that employees are treated during employment without regard to their race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinions or affiliations. Such action shall include, but not be limited to the following:
   1. Employment.
   2. Upgrading.
   3. Demotion or transfer.
   4. Recruitment and advertising.
   5. Layoff or termination.
   6. Rates of pay or other forms of compensation.
   7. Selection for training, including apprenticeship.

B. The contractor, subcontractor, vendor and supplier of goods and services will, in all solicitations or advertisements for employees, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, sex, national origin, ancestry, religion, economic status, age, disability, political opinion or affiliations.

C. The contractor, subcontractor, vendor and supplier or their collective bargaining representative will send to each labor union or representative or workers with which they have a collective bargaining agreement or other contract or understanding, a notice advising the said labor union or workers' representative of the contractor's commitments under this section.

D. The contractor, subcontractor, vendor and supplier of goods and services will comply with all published rules, regulations, directives and orders of the State of Iowa Affirmative Action Program Contract Compliance Provisions.

E. The contractor, subcontractor, vendor and supplier of goods and services will furnish and file compliance reports within such time and upon such forms as provided by the Equal Employment Opportunity Officer, said forms may elicit information as to the policies, procedures, patterns, and practices of each subcontractor as state as the contractor themselves and said contractor, subcontractor, vendor and supplier will permit access to their employment books, records and accounts to the State's Equal Employment Opportunity Officer, for the purpose of investigation to ascertain compliance with this Contract and with rules regulations of the State's Affirmative Action Program.

F. In the event of the contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of such rules, regulations and orders; this Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further contracts in accordance with procedures authorized by the State of Iowa.

G. The contractor, subcontractor, vendor and supplier of goods and services will include, or incorporate by reference, the provisions of the nondiscrimination clause in every contract, subcontract or purchase order unless exempted by the rules, regulations or orders of the State's Affirmative Action Program, and will provide in every subcontract or purchase order that said provisions will be binding upon each contractor, subcontractor or seller.

H. The parties agree to comply with "Compliance with the Law; Nondiscrimination in Employment" of the current Terms and Conditions at the award of this contract. Current Terms and Conditions may be found on the following web site and are, by this reference, made a part of this Agreement. https://das.iowa.gov/procurement/terms-and-conditions

I. We certify and recognize that we are morally and legally committed to nondiscrimination in employment. Any person who applies for employment with our company will not be discriminated against because of race, creed, color, sex, national origin, ancestry, religion, economic status, age or disabilities, unless disabilities are based upon the nature of the job occupation.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 00 4116.02

TARGETED SMALL BUSINESS INFORMATION

This Section is for informational purposes only. All information will be submitted online through the State's IMPACS Electronic Procurement System.

PART 1 - GENERAL

1.01 TARGETED SMALL BUSINESS INFORMATION

A. Subcontractor Targeted Small Business Enterprise Pre-Bid Contact Information, including subcontractor and dollar amount to be subcontracted, is to accompany the Bid submission. Bidders shall comply with all affirmative action/equal opportunity provisions of State and Federal laws. The Owner seeks to provide opportunities for Targeted Small Businesses in accordance with the provisions of Chapter 73 of the Code of Iowa.

B. Search the Targeted Small Business Directory for certified State of Iowa Targeted Small Businesses.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

IOWA DEPARTMENT OF ADMINISTRATIVE SERVICES
SUBCONTRACTOR
TARGETED SMALL BUSINESS ENTERPRISE
PRE-BID CONTRACT INFORMATION

CONTRACTOR	**BID NO.**	**PAGE #**

(to be completed by bidder)

You are requested to provide the information on this form showing your targeted Small Business enterprises contacts made prior to your bid submission. This information is subject to verification and confirmation. NOTE: The Department of General Services will not regard your acceptance or use of a low quote or bid from a non-targeted Small Business Enterprise on any subcontract item as evidence itself of any lack of good faith effort to solicit targeted Small Business Enterprise subcontractors on this project. However, every effort shall be made to solicit quotes or bids on as many subcontractable items as necessary to evidence affirmative action in contracting.

TABLE OF INFORMATION SHOWING BIDDER'S PRE-BID TARGETED SMALL BUSINESS ENTERPRISE CONTACTS

SUBCONTRACTOR	TSB	DATES CONTACTED	QUOTES RECEIVED		QUOTATION USED IN BID	
			YES/NO	DATES	YES/NO	DOLLAR AMOUNT PROPOSED TO BE SUBCONTRACTED

Total dollar amount proposed to be subcontracted to TSB on this project $ _____
List items to be subcontracted. *(If more space is needed, use reverse side.)*

SECTION 00 4313

BID SECURITY FORMS

PART 1 - GENERAL

1.01 BID SECURITY FORMS

A. A Bid Bond form will be required on this project. An amended ConsensusDocs 262 is attached for reference following this page. ConsensusDocs bid bond form is not required (other standard forms are acceptable to the State of Iowa).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

CONSENSUSDOCS 262

BID BOND

(AMENDED BY STATE OF IOWA)

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Trade Contractor, _____ (the "Trade Contractor") has submitted a Bid to the Owner, _____, (the "Owner") for the _____ (the "Project") in accordance with the Bidding Documents, including Drawings and Specifications prepared by _____ (the "Design Professional").

IMPORTANT: A vertical line in the margin indicates a change has been made to the original text. Prior to signing, recipients may wish to request from the party producing the document a "redlined" version indicating changes to the original text. Consultation with legal and insurance counsel and careful review of the entire document are strongly encouraged.
ConsensusDOCS 262 • BID BOND Copyright © 2007, Revised 2009 and 2011, ConsensusDOCS LLC. AN INDIVIDUAL PURCHASE OF THIS DOCUMENT PERMITS THE USER TO PRINT ONE CONTRACT FOR ONE PROJECT ONLY. YOU MAY ONLY MAKE COPIES OF A COMPLETED DOCUMENT FOR DISTRIBUTION TO PARTIES IN DIRECT CONNECTION WITH THE SPECIFIC CONSTRUCTION PROJECT. ANY OTHER USES, INCLUDING COPYING THE DOCUMENT, ARE STRICTLY PROHIBITED.

By virtue of this Bid Bond (the "Bond"), the Constructor as Principal and _____ as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount _____, Dollars ($_____) (the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein.

1. If the Obligee shall accept the bid of the Constructor, the Constructor shall enter into an Agreement with the Obligee in accordance with the terms of such Bid.

2. Constructor shall procure such bond or bonds as are specified in the Contract Documents for the faithful performance of the Work and for the prompt payment of labor and materials furnished in the performance of the Work.

3. If the Constructor fails to enter such Agreement and give such bonds, the Constructor shall pay to the Obligee the difference between the amount of Constructor's bid and the amount of such agreement the Obligee in good faith executes with another Party to perform the Work covered by Constructor's Bid, not to exceed the Bond Sum stated above.

4. If the Constructor shall fulfill its obligation under Articles 1 through 3, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

This Bond is entered into as of _____ (date)

SURETY: _____ (seal)

BY: .....

Print Name: _____

Print Title: _____ (Attach Power of Attorney)

Witness: .....

(Additional signatures, if any, appear on attached page)

Constructor: _____ (seal)

BY: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

IMPORTANT: A vertical line in the margin indicates a change has been made to the original text. Prior to signing, recipients may wish to request from the party producing the document a "redlined" version indicating changes to the original text. Consultation with legal and insurance counsel and careful review of the entire document are strongly encouraged.
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SECTION 00 5200

AGREEMENT FORM

PART 1 - GENERAL

1.01 AGREEMENT FORM

A. The Form of Agreement to be used on this project is a modified ConsensusDocs 802. A sample is attached following this page.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

ConsensusDocs 802

STANDARD FORM OF AGREEMENT BETWEEN OWNER AND TRADE CONTRACTOR

(Where the Construction Manager Is the Owner's Agent)

TABLE OF ARTICLES

1. AGREEMENT
2. GENERAL PROVISIONS
3. TRADE CONTRACTOR'S OBLIGATIONS
4. OWNER'S RESPONSIBILITIES
5. SUBCONTRACTS
6. TRADE CONTRACT TIME
7. TRADE CONTRACT PRICE
8. CHANGES
9. PAYMENT
10. INDEMNITY, INSURANCE, WAIVERS AND BONDS
11. SUSPENSION, NOTICE TO CURE AND TERMINATION OF AGREEMENT
12. DISPUTE MITIGATION AND RESOLUTION
13. MISCELLANEOUS PROVISIONS
14. TRADE CONTRACT DOCUMENTS

This Agreement has important legal and insurance consequences. Consultations with an attorney and with insurance and surety consultants are encouraged with respect to its completion or modification. Notes indicate where information is to be inserted to complete this Agreement.

DRAFT

ConsensusDocs™ 802 - Standard Form of Agreement Between Owner and Trade Contractor (CM is Owner's Agent) - © 2007, Revised March 2012. THIS DOCUMENT MAY HAVE BEEN MODIFIED FROM THE STANDARD LANGUAGE, and a report of modifications can be generated through the ConsensusDocs platform. Purchase of the document permits the user to print one contract for each party to the contract within one project only. You may only make copies of finalized documents for distribution to parties in direct connection with this contract. Any other uses are strictly prohibited.

ARTICLE 1 AGREEMENT

This Trade Contractor Agreement is made effective as of the xx day of Month, Year , by and between the

OWNER

State of Iowa - DAS, Department of Administrative Services ("DAS"). DAS's principal office is located: 109 SE 13th Street, Des Moines, IA 50319-0120.

and the

TRADE CONTRACTOR
Contractor Name
Address
City, State, Zip

for work in connection with the following

PROJECT
XXXX.XX - Project Name

The CONSTRUCTION MANAGER is
Construction Manager Name
Address
City, State, Zip

The DESIGN PROFESSIONAL for the Project is
Designer Name
Address
City, State, Zip

Notice to the Parties shall be given at the above addresses.

ARTICLE 2 GENERAL PROVISIONS

2.1 RELATIONSHIP OF PARTIES The Owner and the Trade Contractor agree to proceed with this Agreement on the basis of mutual trust, good faith and fair dealing and shall cooperate with each other and with the Construction Manager and Design Professional in furthering the Owner's interests. The Trade Contractor shall use its diligent efforts to perform the work in an expeditious manner consistent with the Trade Contract Documents. The Owner and the Trade Contractor will endeavor to promote harmony and cooperation among all Project participants.

2.1.1 The Owner and the Trade Contractor shall perform their obligations with integrity, ensuring at a minimum that

2.1.1.1 conflicts of interest shall be avoided or disclosed promptly to the other Party; and

2.1.1.2 the Trade Contractor and the Owner warrant that they have not and shall not pay nor receive any contingent fees or gratuities to or from the other Party, including its agents, officers and employees, Subcontractors or others for whom they may be liable, to secure preferential

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treatment.

2.2 PROJECT ORGANIZATION This Agreement is for the performance of work described herein in connection with the construction of the Project. The Owner also may enter into separate agreements with other trade contractors for other portions of the Project. The Owner has entered or will enter into a Construction Management Agreement with the Construction Manager, and a design agreement with the Design Professional.

2.3 INDEPENDENT CONTRACTOR The Trade Contractor represents that it is an independent contractor and that its performance of the Trade Contract Work it shall act as an independent contractor. Neither Trade Contractor nor any of its agents or employees shall act on behalf of the Owner except as provided in this Agreement or unless authorized in writing by the Owner.

2.4 CONSTRUCTION MANAGER IS OWNER'S AGENT The Construction Manager will represent the Owner as its agent in the administration and management of this Agreement. Any instructions, reviews, approvals, orders or directions given to the Trade Contractor by the Construction Manager will be given on behalf of and as agent for the Owner. The Trade Contractor shall be obligated to respond or perform as if the same were given directly by the Owner. The Trade Contractor shall communicate and provide all requests and concerns regarding the Trade Contract Work to the Construction Manager. The Trade Contractor shall provide copies to the Construction Manager of all notices to the Owner required by and regarding this Agreement.

2.5 CONSTRUCTION MANAGER NOT IN PRIVITY WITH TRADE CONTRACTOR This Agreement shall not give the Trade Contractor any claim or right of action against the Construction Manager. The Trade Contractor and its subcontractors shall not be beneficiaries of any obligations of the Construction Manager. This Agreement shall not create a contractual relationship between any parties except the Owner and the Trade Contractor.

2.5A NO THIRD-PARTY BENEFICIARY There are no third-party beneficiaries of this Agreement.

2.6 DESIGN PROFESSIONAL The Owner, through its Design Professional, shall provide all architectural and engineering design services necessary for the completion of the Work, except the following:

No exceptions

The Trade Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering except as otherwise provided in section 3.15.

2.6.1 The Owner shall obtain from the Design Professional either a license for Trade Contractor and Subcontractors to use the design documents prepared by the Design Professional or ownership of the copyrights for such design documents, and shall defend, indemnify and hold harmless the Trade Contractor against any suits or claims of infringement of any copyrights or licenses arising out of the use of the design documents. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

2.7 EXTENT OF AGREEMENT This Agreement is solely for the benefit of the Parties, represents the entire integrated agreement between the Parties, and supersedes all prior negotiations, representations and agreements, either written or oral. This Agreement and each and every provision is for the exclusive benefit of the Owner and the Trade Contractor and not for the benefit of any third party except to the extent expressly provided in this Agreement. In the event of conflict between this Agreement and any of the Exhibits or any other documents incorporated into this Agreement, the terms and provisions of this Agreement shall control.

2.8 DEFINITIONS

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2.8.1 Agreement means this ConsensusDocs 802 Standard Form of Agreement Between Owner and Trade Contractor (Where the Construction Manager is the Owner's Agent), as modified by the Parties, and Exhibits and Attachments made part of this Agreement upon its execution.

2.8.2 Design Professional means the Architect, Design Professional or Engineer identified in ARTICLE 1 and its consultants, retained by Owner to perform design services for the Project, and licensed in the State in which the Project is located. The use of the term Design Professional in this Agreement is for convenience and is not intended to imply or infer that the individual or entity named in ARTICLE 1 will provide design professional services in a discipline in which it is not licensed.

2.8.3 Construction Manager means the Construction Manager identified in ARTICLE 1 and its authorized representative.

2.8.4 The Construction Schedule is the document initially prepared by and updated by the Construction Manager and approved by the Owner that indicates proposed activity sequences, durations, or milestone dates for such activities as receipt and approval of pertinent information, issuance of the Construction Documents, the preparation and processing of shop drawings and samples, delivery of materials or equipment requiring long-lead-time procurement, Owner's occupancy requirements and estimated dates of Substantial Completion and Final Completion of the Project.

2.8.5 The term Day shall mean calendar day unless otherwise specifically defined.

2.8.6 Final Completion occurs on the date when the Trade Contractor's obligations under this Agreement are complete and accepted by the Owner and final payment becomes due and payable, as established in ARTICLE 6. This date shall be confirmed by a Certificate of Final Completion signed by the Owner and the Trade Contractor.

2.8.7 A Hazardous Material is any substance or material identified now or in the future as toxic or hazardous under any federal, state or local law or regulation, or any other substance or material which may be considered hazardous or otherwise subject to statutory or regulatory requirements governing handling, disposal or clean-up.

2.8.8 A Material Supplier is a person or entity retained by the Trade Contractor to provide material or equipment for the Trade Contract Work. This definition is not intended to, and shall not be interpreted to, expand or modify the definition(s) of materials or material suppliers contained in Iowa Code Chapter 573.

2.8.9 Others means other contractors, material suppliers, and persons at the Worksite who are not employed by the Trade Contractor or Subcontractors.

2.8.10 The term Overhead shall mean a) payroll costs and other compensation of Trade Contractor employees in the Trade Contractor's principal and branch offices; b) general and administrative expenses of the Trade Contractor's principal and branch offices including deductibles paid on any insurance policy and c) the Trade Contractor's capital expenses, including interest on capital used for the Work.

2.8.11 Owner is the person or entity identified in ARTICLE 1 as Owner, and includes the Owner's representative.

2.8.12 The Project, as identified in ARTICLE 1, is the building, facility or other improvements for which the Trade Contractor is to perform the Trade Contract Work.

2.8.13 A Subcontractor is a person or entity retained by the Trade Contractor as an independent contractor to provide the labor, materials, equipment or services necessary to complete a specific

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portion of the Work. This definition is not intended to, and shall not be interpreted to, expand or modify the definition(s) of materials or material suppliers contained in Iowa Code Chapter 573.

2.8.14 2.8.14 Per Iowa Code Section 26.13, "substantially completed" means the first date on which any of the following occurs:(1) Completion of the Project (or Trade Contract Work, in the case of the multiple Trade Contractors) or when the Project (or Trade Contract Work in the case of multiple Trade Contractors) has been substantially completed in general accordance with the terms and provisions of the contract. (2) The work on the Project (or Trade Contract Work in the case of multiple Trade Contractors) or on the designated portion is substantially completed in general accordance with the terms of the contract so that the State Iowa can occupy or utilize the Project or designated portion of the Project for its intended purpose. 3) The Project (or Trade Contract Work in the case of multiple Trade Contractors) is certified as having been substantially completed by either of the following: (a) the architect or engineer authorized to make such certification (which is defined in this Agreement as the Design Professional). (b) The authorized contract representative (which is defined in this Agreement as the Owner's Representative). (4) The State of Iowa is occupying or utilizing the Project (or Trade Contract Work in the case of multiple Trade Contractors) for its intended purpose. This subparagraph shall not apply to highway, bridge, or culvert projects.

2.8.15 Terrorism means a violent act, or an act that is dangerous to human life, property or infrastructure, that is committed by an individual or individuals and that appears to be part of an effort to coerce a civilian population or to influence the policy or affect the conduct of any government by coercion. Terrorism includes, but is not limited to, any act certified by the United States government as an act of terrorism pursuant to the Terrorism Risk Insurance Act, as amended.

2.8.16 A Trade Contract Change Order is a written order signed by the Owner and the Trade Contractor after execution of this Agreement, indicating changes in the scope of the Trade Contract Work, the Trade Contract Price or Trade Contract Time, including substitutions proposed by the Trade Contractor and accepted by the Owner. Trade Contract Change Orders shall be executed using the ConsensusDOCS 813 Trade Contract Change Order (CM as Owner's Agent) form document with exhibits attached as necessary.

2.8.17 The Trade Contract Documents consist of this Agreement (as modified), the drawings, specifications, addenda issued prior to execution of this Agreement, approved submittals, information furnished by the Owner under subsection 4.1.3, the bid documents, other documents listed in this Agreement and any modifications issued after execution.

2.8.18 The Trade Contract Price is the amount indicated in section 7.1 of this Agreement.

2.8.19 The Trade Contract Time is the period between the Date of Commencement and Final Completion.

2.8.20 Trade Contract Work means the construction and services provided by the Trade Contractor.

2.8.20.1 Changed Work means work that is different from the original scope of Trade Contract Work; or work that changes the Trade Contract Price or Trade Contract Time.

2.8.20.2 Defective Work is any portion of the Trade Contract Work that is not in conformance with the Trade Contract Documents.

2.8.21 The Trade Contractor is the person or entity identified in ARTICLE 1 and includes the Trade Contractor's Representative.

2.8.22 The term Work means the construction and services necessary or incidental to fulfill the Trade

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Contractors' obligations for the Project. The Work may refer to the whole Project or only a part of the Project.

2.8.23 Worksite means the geographical area at the location of the Project as identified in ARTICLE 1 where the Trade Contract Work is to be performed.

ARTICLE 3 TRADE CONTRACTOR'S OBLIGATIONS

3.1 GENERAL RESPONSIBILITIES

3.1.1 RESPONSIBILITIES The Trade Contractor shall provide all of the labor, materials, equipment and services necessary to complete the Trade Contract Work, all of which shall be provided in full accord with or as reasonably inferable from the Trade Contract Documents as being necessary to produce the indicated results.

3.1.2 The Trade Contractor shall be responsible for the supervision and coordination of the Trade Contract Work, including the construction means, methods, techniques, sequences and procedures utilized, unless the Trade Contract Documents give other specific instructions. In such case, the Trade Contractor shall not be liable to the Owner for damages resulting from compliance with such instructions unless the Trade Contractor recognized and failed to timely report to the Owner any error, inconsistency, omission or unsafe practice that it discovered in the specified constructionmeans, methods, techniques, safety, sequences or procedures.

3.1.3 The Trade Contractor shall perform Trade Contract Work only within locations allowed by the Trade Contract Documents, applicable permits and applicable local law.

3.2 COOPERATION WITH WORK OF OWNER AND OTHERS

3.2.1 The Owner may perform work at the Worksite directly or by Others. Any agreements with Others to perform construction or operations related to the Project shall include provisions pertaining to insurance, indemnification, waiver of subrogation, coordination, interference, clean up and safety which are substantively the same as the corresponding provisions of this Agreement.

3.2.2 In the event that the Owner elects to perform work at the Worksite directly or by Others, the Trade Contractor and the Owner shall, with the assistance of the Construction Manager, coordinate the activities of all forces at the Worksite and agree upon fair and reasonable schedules and operational procedures for Worksite activities. The Owner shall require each separate contractor to cooperate with the Trade Contractor and assist with the coordination of activities and the review of construction schedules and operations. The Trade Contract Price and Trade Contract Time shall be equitably adjusted, as mutually agreed by the Parties, for subsequent changes made necessary by the coordination of construction activities, and the Trade Contactor's construction schedule and the Construction Schedule shall be revised accordingly. The Trade Contractor, Owner and Others shall adhere to the revised Construction Schedule until it may subsequently be revised.

3.2.3 With regard to the work of the Owner and Others, the Trade Contractor shall (a) proceed with the Trade Contract Work in a manner which does not hinder, delay or interfere with the work of the Owner or Others or cause the work of the Owner or Others to become defective, (b) afford the Owner or Others reasonable access for introduction and storage of their materials and equipment and performance of their activities, and (c) coordinate the Trade Contractor's construction and operations with theirs as required by this section.

3.2.4 Before proceeding with any portion of the Trade Contract Work affected by the construction or operations of the Owner or Others, the Trade Contractor shall give the Owner and Construction

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Manager prompt written notification of any defects the Trade Contractor discovers in their work which will prevent the proper execution of the Trade Contract Work. The Trade Contractor's obligations in this section do not create a responsibility for the work of the Owner or Others, but are for the purpose of facilitating the Trade Contract Work. If the Trade Contractor does not notify the Owner and Construction Manager of patent defects interfering with the performance of the Trade Contract Work, the Trade Contractor acknowledges that the work of the Owner or Others is not defective and is acceptable for the proper execution of the Trade Contract Work. Following receipt of written notice from the Trade Contractor of defects, the Owner, through the Construction Manager, shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.3 RESPONSIBILITY FOR PERFORMANCE

3.3.1 In order to facilitate its responsibilities for completion of the Work in accordance with and as reasonably inferable from the Trade Contract Documents, prior to commencing the Work the Trade Contractor shall examine and compare the drawings and specifications with information furnished by the Owner pursuant to subsection 4.1.3, relevant field measurements made by the Trade Contractor and any visible conditions at the Worksite affecting the Trade Contract Work.

3.3.2 If in the course of the performance of the obligations in subsection 3.3.1 the Trade Contractor discovers any errors, omissions or inconsistencies in the Contract Documents, the Trade Contractor shall promptly report them to the Owner and Construction Manager. It is recognized, however, that the Trade Contractor is not acting in the capacity of a licensed design professional, and that the Trade Contractor's examination is to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from the Trade Contractor of defects, the Owner shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.3.3 The Trade Contractor shall have no liability for errors, omissions or inconsistencies discovered under subsections 3.3.1 and 3.3.2 unless the Trade Contractor fails to report a recognized problem to the Owner and Construction Manager.

3.3.4 The Trade Contractor may be entitled to additional costs or time if there are changes in the scope of the Trade Contract Work that increase the cost of the Work or increase the number of days required to perform the Work, respectively, because of clarifications or instructions arising out of the Trade Contractor's reports described in the three preceding Subsections.

3.4 CONSTRUCTION PERSONNEL AND SUPERVISION

3.4.1 The Trade Contractor shall provide competent supervision for the performance of the Trade Contract Work. Before commencing the Trade Contract Work, Trade Contractor shall notify Owner and Construction Manager in writing of the name and qualifications of its proposed superintendent(s) and project manager so Owner and Construction Manager may review the individual's qualifications. If, for reasonable cause, the Owner or Construction Manager refuses to approve the individual, or withdraws its approval after once giving it, Trade Contractor shall name a different superintendent or project manager for Owner's and Construction Manager's review. Any disapproved superintendent shall not perform in that capacity thereafter at the Worksite.

3.4.2 The Trade Contractor shall be responsible to the Owner for acts or omissions of parties or entities performing portions of the Trade Contract Work for or on behalf of the Trade Contractor or any of its Subcontractors.

3.4.3 The Trade Contractor shall permit only qualified persons to perform the Trade Contract Work. The

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Trade Contractor shall enforce safety procedures, strict discipline and good order among persons performing the Trade Contract Work. If the Owner or Construction Manager determines that a particular person does not follow safety procedures, or is unfit or unskilled for the assigned work, the Trade Contractor shall immediately reassign the person on receipt of the Owner's or Construction Manager's written notice to do so.

3.4.4 TRADE CONTRACTOR'S REPRESENTATIVE The Trade Contractor's authorized representative is . The Trade Contractor's representative shall possess full authority to receive instructions from the Owner and to act on those instructions. The Trade Contractor shall notify the Owner and the Construction Manager in writing of a change in the designation of the Trade Contractor's representative. The Trade Contractor's representative is also authorized to bind the Trade Contractor in all matters relating to this Agreement including, without limitation, all matters requiring the Trade Contractor's approval, authorization, or written notice. The Trade Contractor's representative is also authorized to resolve disputes in accordance with Section 12.2 of this Agreement.

3.5 MATERIALS FURNISHED BY THE OWNER OR OTHERS

3.5.1 In the event the Trade Contract Work includes installation of materials or equipment furnished by the Owner or Others, it shall be the responsibility of the Trade Contractor to examine the items so provided and thereupon handle, store and install the items, unless otherwise provided in the Trade Contract Documents, with such skill and care as to provide a satisfactory and proper installation. Loss or damage due to acts or omissions of the Trade Contractor shall be the responsibility of the Trade Contractor and may be deducted from any amounts due or to become due the Trade Contractor. Any defects discovered in such materials or equipment shall be reported at once to the Owner and Construction Manager. Following receipt of written notice from the Trade Contractor of defects, the Owner shall promptly inform the Trade Contractor what action, if any, the Trade Contractor shall take with regard to the defects.

3.6 TESTS AND INSPECTIONS

3.6.1 The Trade Contractor shall schedule all required tests, approvals and inspections of the Trade Contract Work or portions thereof at appropriate times so as not to delay the progress of the Trade Contract Work or other work related to the Project. The Trade Contractor shall give proper notice to the Construction Manager and to all required parties of such tests, approvals and inspections. If feasible, the Owner and Others may timely observe the tests at the normal place of testing. Except as provided in subsection 3.6.3, the Owner shall bear all expenses associated with tests, inspections and approvals required by the Trade Contract Documents, which, unless otherwise agreed to, shall be conducted by an independent testing laboratory or entity retained by the Owner. Unless otherwise required by the Trade Contract Documents, required certificates of testing, approval or inspection shall be secured by the Trade Contractor and promptly delivered to the Owner and Construction Manager.

3.6.2 If the Owner, Construction Manager or appropriate authorities determine that tests, inspections or approvals in addition to those required by the Trade Contract Documents will be necessary, the Trade Contractor shall arrange for the procedures and give timely notice to the Owner, Construction Manager and Others who may observe the procedures. Costs of the additional tests, inspections or approvals are at the Owner's expense except as provided in subsection 3.6.3.

3.6.3 If the procedures described in subsections 3.6.1 and 3.6.2 indicate that portions of the Trade Contract Work fail to comply with the Trade Contract Documents, the Trade Contractor shall be responsible for costs of correction and retesting.

3.7 WARRANTY

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3.7.1 The Trade Contract Work shall be executed in accordance with the Trade Contract Documents in a workmanlike manner. The Trade Contractor warrants that all materials and equipment shall be furnished in sufficient quantities to facilitate the proper and expeditious execution of the Trade Contract Work and shall be new unless otherwise specified, of good quality, in conformance with the Trade Contract Documents, and free from defective workmanship and materials. At the Owner's or Construction Manager's request, the Trade Contractor shall furnish satisfactory evidence of the quality and type of materials and equipment furnished. The Trade Contractor further warrants that the Trade Contract Work shall be free from material defects not intrinsic in the design or materials required in the Trade Contract Documents. The Trade Contractor's warranty does not include remedies for defects or damages caused by normal wear and tear during normal usage, use for a purpose for which the Project was not intended, improper or insufficient maintenance, modifications performed by the Owner or Others, or abuse. The Trade Contractor's warranty pursuant to this section shall commence on the Date of Substantial Completion.

3.7.2 The Trade Contractor shall obtain from its Subcontractors and material suppliers any special or extended warranties required by the Trade Contract Documents. All such warranties shall be listed in an attached Exhibit to this Agreement.

3.8 CORRECTION OF TRADE CONTRACT WORK WITHIN ONE YEAR

3.8.1 If, prior to Substantial Completion and within one year after the date of Substantial Completion of the Trade Contract Work, any Defective Work is found, the Owner shall promptly notify the Trade Contractor in writing. Unless the Owner provides written acceptance of the condition, the Trade Contractor shall promptly correct the Defective Work at its own cost and time and bear the expense of additional services required for correction of any Defective Work for which it is responsible. If within the one-year correction period the Owner discovers and does not promptly notify the Trade Contractor or give the Trade Contractor an opportunity to test or correct Defective Work as reasonably requested by the Trade Contractor, the Owner waives the Trade Contractor's obligation to correct that Defective Work as well as the Owner's right to claim a breach of the warranty with respect to that Defective Work.

3.8.2 With respect to any portion of Trade Contract Work first performed after Substantial Completion, the one-year correction period shall be extended by the period of time between Substantial Completion and the actual performance of the later Trade Contract Work. Correction periods shall not be extended by corrective work performed by the Trade Contractor.

3.8.3 If the Trade Contractor fails to correct Defective Work within a reasonable time after receipt of written notice from the Owner prior to final payment, the Owner may correct it in accordance with the Owner's right to carry out the Trade Contract Work in section 11.2. In such case, an appropriate Trade Contract Change Order shall be issued deducting the cost of correcting such deficiencies from payments then or thereafter due the Trade Contractor. If payments then or thereafter due Trade Contractor are not sufficient to cover such amounts, the Trade Contractor shall pay the difference to the Owner.

3.8.4 If after the one-year correction period but before the applicable limitation period the Owner discovers any Defective Work, the Owner shall, unless the Defective Work requires emergency correction, promptly notify the Trade Contractor. If the Trade Contractor elects to correct the Defective Work, it shall provide written notice of such intent within fourteen (14) Days of its receipt of notice from the Owner. The Trade Contractor shall complete the correction of Defective Work within a time frame mutually agreed upon by the Trade Contractor and the Owner. If the Trade Contractor does not elect to correct the Defective Work, the Owner may have the Defective Work corrected by itself or Others and charge the Trade Contractor for the reasonable cost of the correction and other directly related

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expenses. Owner shall provide Trade Contractor with an accounting of correction costs it incurs.

3.8.5 If the Trade Contractor's correction or removal of Defective Work causes damage to or destroys other completed or partially completed Work or existing buildings, the Trade Contractor shall be responsible for the cost of correcting the destroyed or damaged property.

3.8.6 The one-year period for correction of Defective Work does not constitute a limitation period with respect to the enforcement of the Trade Contractor's other obligations under the Trade Contract Documents.

3.8.7 Prior to final payment, at the Owner's option and with the Trade Contractor's agreement, the Owner may elect to accept Defective Work rather than require its removal and correction. In such case the Contract Price shall be equitably adjusted for any diminution in the value of the Project caused by such Defective Work. Before the Owner accepts any such change it must be documented in writing with a Change Order signed by both the Trade Contractor and Owner.

3.9 CORRECTION OF COVERED TRADE CONTRACT WORK

3.9.1 On request of the Owner or Construction Manager, Trade Contract Work that has been covered without a requirement that it be inspected prior to being covered may be uncovered for the Owner's or Construction Manager's inspection. The Owner shall pay for the costs of uncovering and replacement if the Work proves to be in conformance with the Trade Contract Documents, or if the defective condition was caused by the Owner or Others. If the uncovered Trade Contract Work proves to be defective, the Trade Contractor shall pay the costs of uncovering and replacement.

3.9.2 If contrary to specific requirements in the Trade Contract Documents or contrary to a specific request from the Owner or Construction Manager, a portion of the Trade Contract Work is covered, the Owner or Construction Manager, by written request, may require the Trade Contractor to uncover the Trade Contract Work for the Owner's or Construction Manager's observation. In this circumstance the Trade Contract Work shall be uncovered and recovered at the Trade Contractor's expense and with no adjustment to the Trade Contract Time. Costs incurred by the Owner as a direct result of the above shall be deducted from the Trade Contract Price.

3.10 SAFETY OF PERSONS AND PROPERTY

3.10.1 SAFETY PRECAUTIONS AND PROGRAMS The Trade Contractor shall have overall responsibility for safety precautions and programs in the performance of the Trade Contract Work. While this section establishes the responsibility for safety between the Owner and Trade Contractor, it does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with the provisions of applicable laws and regulations.

3.10.2 The Trade Contractor shall seek to avoid injury, loss or damage to persons or property by taking reasonable steps to protect:

3.10.2.1 its employees and other persons at the Worksite;

3.10.2.2 materials and equipment stored at on-site or off-site locations for use in the Trade Contract Work; and

3.10.2.3 property located at the site and adjacent to Trade Contract Work areas, whether or not the property is part of the Trade Contract Work.

3.10.3 TRADE CONTRACTOR'S SAFETY REPRESENTATIVE The Trade Contractor's Worksite Safety Representative is who shall act as the Trade Contractor's authorized safety representative with a duty

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to prevent accidents in accordance with subsection 3.10.2 If no individual is identified in this section, the authorized safety representative shall be the Trade Contractor's Representative. The Trade Contractor shall report immediately in writing to the Owner and Construction Manager all recordable accidents and injuries occurring at the Worksite. When the Trade Contractor is required to file an accident report with a public authority, the Trade Contractor shall furnish a copy of the report to the Owner and Construction Manager.

3.10.4 The Trade Contractor shall provide the Owner and Construction Manager with copies of all notices required of the Trade Contractor by law or regulation. The Trade Contractor's safety program shall comply with the requirements of governmental and quasi-governmental authorities having jurisdiction.

3.10.5 Damage or loss not insured under property insurance which may arise from the Trade Contract Work, to the extent caused by the negligent acts or omissions of the Trade Contractor, or anyone for whose acts the Trade Contractor may be liable, shall be promptly remedied by the Trade Contractor.

3.10.6 If the Owner or Construction Manager deems any part of the Trade Contract Work or Worksite unsafe, the Owner or Construction Manager, without assuming responsibility for the Trade Contractor's safety program, may require the Trade Contractor to stop performance of the Trade Contract Work or take corrective measures satisfactory to the Owner, or both. If the Trade Contractor does not adopt corrective measures, the Owner may perform them and deduct their cost from the Trade Contract Price. The Trade Contractor agrees to make no claim for damages, for an increase in the Trade Contract Price or for a change in the Trade Contract Time based on the Trade Contractor's compliance with the Owner's or Construction Manager's reasonable request.

3.11 EMERGENCIES

3.11.1 In an emergency, the Trade Contractor shall act in a reasonable manner to prevent personal injury or property damage. Any change in the Trade Contract Price or Trade Contract Time resulting from the actions of the Trade Contractor in an emergency situation shall be determined as provided in ARTICLE 8.

3.12 HAZARDOUS MATERIALS

3.12.1 The Trade Contractor shall not be obligated to commence or continue Trade Contract Work until any Hazardous Material discovered at the Worksite has been removed, rendered or determined to be harmless by the Owner as certified by an independent testing laboratory and approved by the appropriate government agency.

3.12.2 If after the commencement of the Trade Contract Work a Hazardous Material is discovered at the Worksite, the Trade Contractor shall be entitled to immediately stop Trade Contract Work in the affected area. The Trade Contractor shall report the condition to the Owner, the Construction Manager, and, if required, the government agency with jurisdiction.

3.12.3 The Trade Contractor shall not be required to perform any Trade Contract Work relating to or in the area of Hazardous Material without written mutual agreement.

3.12.4 The Owner shall be responsible for retaining an independent testing laboratory to determine the nature of the Hazardous Material encountered and whether the material requires corrective measures or remedial action. Such measures shall be the sole responsibility of the Owner, and shall be performed in a manner minimizing any adverse effects upon the Trade Contract Work. The Trade Contractor shall resume Trade Contract Work in the area affected by any Hazardous Material only upon written agreement between the Parties after the Hazardous Material has been removed or rendered harmless

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and only after approval, if necessary, of the governmental agency with jurisdiction.

3.12.5 If the Trade Contractor incurs additional costs or is delayed due to the presence or remediation of Hazardous Material, the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price or the Trade Contract Time.

3.12.6 To the extent not caused by the negligent acts or omissions of the Trade Contractor, its Subcontractors and Sub-subcontractors, and the agents, officers, directors and employees of each of them, the Owner shall defend, indemnify and hold harmless the Trade Contractor, its Subcontractors and Sub-subcontractors, and the agents, officers, directors and employees of each of them, from and against any and all direct claims, damages, losses, costs and expenses, including but not limited to attorney's fees, costs and expenses incurred in connection with any dispute resolution process, to the extent permitted pursuant to section 6.6, arising out of or relating to the performance of the Trade Contract Work in any area affected by Hazardous Material. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.12.7 MATERIALS BROUGHT TO THE WORKSITE

3.12.7.1 Material Safety Data (MSD) sheets as required by law and pertaining to materials or substances used or consumed in the performance of the Trade Contract Work, whether obtained by the Trade Contractor, Subcontractors, the Owner or Others, shall be maintained at the Worksite by the Trade Contractor and made available to the Owner, Construction Manager, Subcontractors and Others.

3.12.7.2 The Trade Contractor shall be responsible for the proper delivery, handling, application, storage, removal and disposal of all materials and substances brought to the Worksite by the Trade Contractor in accordance with the Trade Contract Documents and used or consumed in the performance of the Trade Contract Work.

3.12.7.3 The Trade Contractor shall indemnify and hold harmless the Owner, Construction Manager, their agents, officers, directors and employees, from and against any and all claims, damages, losses, costs and expenses, including but not limited to attorney's fees, costs and expenses incurred in connection with any dispute resolution procedure, arising out of or relating to the delivery, handling, application, storage, removal and disposal of all materials and substances brought to the Worksite by the Trade Contractor in accordance or not in accordance with the Trade Contract Documents. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.12.8 The terms of this section shall survive the completion of the Trade Work or any termination of this Agreement.

3.13 SUBMITTALS

3.13.1 The Trade Contractor shall submit to the Construction Manager, and the Design Professional, for review and approval all shop drawings, samples, product data and similar submittals required by the Trade Contract Documents. Submittals may be submitted in electronic form if required in accordance with ConsensusDocs 200.2 and subsection 4.4.1. The Trade Contractor shall be responsible to the Owner for the accuracy and conformity of its submittals to the Trade Contract Documents. The Trade Contractor shall prepare and deliver its submittals in a manner consistent with the Construction Schedule and in such time and sequence so as not to delay the performance of the Trade Contract Work or the work of the Owner and Others. When the Trade Contractor delivers its submittals the Trade Contractor shall identify in writing for each submittal all changes, deviations or substitutions from the requirements of the Trade Contract Documents. The review and approval of any Trade Contractor

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submittal shall not be deemed to authorize changes, deviations or substitutions from the requirements of the Trade Contract Documents unless express written approval is obtained from the Owner specifically authorizing such deviation, substitution or change. To the extent a change, deviation or substitution causes an impact to the Contract Price or Contract Time, such approval shall be promptly memorialized in a Change Order. Further, the Construction Manager and Design Professional shall not make any change, deviation or substitution through the submittal process without specifically identifying and authorizing such deviation to the Trade Contractor. In the event that the Trade Contract Documents do not contain submittal requirements pertaining to the Trade Contract Work, the Trade Contractor agrees upon request to submit in a timely fashion to the Construction Manager and the Design Professional for review and approval any shop drawings, samples, product data, manufacturers' literature or similar submittals as may reasonably be required by the Owner, Construction Manager, or Design Professional.

3.13.2 The Owner shall be responsible for review and approval of submittals with reasonable promptness to avoid causing delay.

3.13.3 The Trade Contractor shall perform all Trade Contract Work strictly in accordance with approved submittals. Approval of shop drawings is not authorization to Trade Contractor to perform Changed Work, unless the procedures of ARTICLE 8 are followed. Approval does not relieve the Trade Contractor from responsibility for Defective Work resulting from errors or omissions of any kind on the approved Shop Drawings.

3.13.4 Record copies of the following, incorporating field changes and selections made during construction, shall be maintained by the Trade Contractor at the Project site and available to the Owner upon request: drawings, specifications, addenda, Trade Contract Change Order and other modifications, and required submittals including product data, samples and shop drawings.

3.13.5 No substitutions shall be made in the Trade Contract Work unless permitted in the Trade Contract Documents and then only after the Trade Contractor obtains approvals required under the Trade Contract Documents for substitutions. All such substitutions shall be promptly memorialized in a Change Order no later than seven (7) Days following approval by the Owner and, if applicable, provide for an adjustment in the Contract Price or Contract Time.

3.13.6 The Trade Contractor shall prepare and submit to the Construction Manager for submission to the Owner

(Check one only)

☒ final marked up as-built drawings

☐ updated electronic data, in accordance with ConsensusDocs 200.2 and section 4.4.1

☐ such documentation as defined by the Parties by attachment to this Agreement,

in general documenting how the various elements of the Trade Contract Work were actually constructed or installed.

3.14 PROFESSIONAL SERVICES

3.14.1 The Trade Contractor may be required to procure professional services in order to carry out its responsibilities for construction means, methods, techniques, sequences and procedures for such services specifically called for by the Contract Documents. The Trade Contractor shall obtain these professional services and any design certifications required from State of Iowa licensed design professionals. All drawings, specifications, calculations, certifications and submittals prepared by such

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design professionals shall bear the signature and seal of such design professionals and the Owner and the Design Professional shall be entitled to rely upon the adequacy, accuracy and completeness of such design services. If professional services are specifically required by the Contract Documents, the Owner shall indicate all required performance and design criteria. The Trade Contractor shall not be responsible for the adequacy of such performance and design criteria. The Trade Contractor shall not be required to provide such services in violation of existing laws, rules and regulations in the jurisdiction where the Project is located.

3.15 WORKSITE CONDITIONS

3.15.1 WORKSITE VISIT The Trade Contractor acknowledges that it has visited, or has had the opportunity to visit, the Worksite to visually inspect the general and local conditions which could affect the Trade Contract Work.

3.15.2 CONCEALED OR UNKNOWN SITE CONDITIONS If the conditions at the Worksite are (a) subsurface or other concealed physical conditions which are materially different from those indicated in the Trade Contract Documents, or (b) unusual and unknown physical conditions which are materially different from conditions ordinarily encountered and generally recognized as inherent in Trade Contract Work provided for in the Trade Contract Documents, the Trade Contractor shall stop Trade Contract Work and give immediate written notice of the condition to the Owner, Construction Manager and the Design Professional. The Trade Contractor shall not be required to perform any work relating to the unknown condition without the written mutual agreement of the Parties. Any change in the Contract Price or the Contract Time as a result of the unknown condition shall be determined as provided in this article. The Trade Contractor shall provide the Owner and the Construction Manager with written notice of any claim as a result of unknown conditions within the time period set forth in section 8.4.

3.16 PERMITS AND TAXES

3.16.1 Trade Contractor shall give public authorities all notices required by law and, except for permits and fees which are the responsibility of the Owner pursuant to section 4.2, shall obtain and pay for all necessary permits, licenses and renewals pertaining to the Trade Contract Work. Trade Contractor shall provide to Owner copies of all notices, permits, licenses and renewals required under this Agreement.

3.16.2 Trade Contractor shall pay all applicable taxes legally enacted when bids are received or negotiations concluded for the Trade Contract Work provided by the Trade Contractor.

3.16.3 The Contract Price or Contract Time shall be equitably adjusted by Trade Contract Change Order for additional costs resulting from any changes in laws, ordinances, rules and regulations enacted after the date of this Agreement, including increased taxes.

3.16.3 (Deleted)

3.17 CUTTING, FITTING AND PATCHING

3.17.1 The Trade Contractor shall perform cutting, fitting and patching necessary to coordinate the various parts of the Trade Contract Work and to prepare its Trade Contract Work for the work of the Owner or Others.

3.17.2 Cutting, patching or altering the work of the Owner or Others shall be done with the prior written approval of the Owner. Such approval shall not be unreasonably withheld.

3.18 CLEANING UP

3.18.1 The Trade Contractor shall regularly remove debris and waste materials at the Worksite resulting

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from the Trade Contract Work. Prior to discontinuing Trade Contract Work in an area, the Trade Contractor shall clean the area and remove all rubbish and its construction equipment, tools, machinery, waste and surplus materials. The Trade Contractor shall minimize and confine dust and debris resulting from construction activities. At the completion of the Trade Contract Work, the Trade Contractor shall remove from the Worksite all construction equipment, tools, surplus materials, waste materials and debris.

3.18.2 If the Trade Contractor fails to commence compliance with cleanup duties within two (2) business Days after written notification from the Owner or the Construction Manager of noncompliance, the Owner may implement appropriate cleanup measures without further notice and the cost shall be deducted from any amounts due or to become due the Trade Contractor in the next payment period.

3.19 ACCESS TO TRADE CONTRACT WORK The Trade Contractor shall facilitate the access of the Owner, Construction Manager, Design Professional and Others to Trade Contract Work in progress.

3.20 COST MONITORING The Trade Contractor shall provide the Construction Manager with cost monitoring information appropriate for the manner of Trade Contractor's compensation, to enable the Construction Manager to develop and track construction and project budgets, including amounts for work in progress, uncompleted work and proposed changes.

3.21 ROYALTIES, PATENTS AND COPYRIGHTS The Trade Contractor shall pay all royalties and license fees which may be due on the inclusion of any patented or copyrighted materials, methods or systems selected by the Trade Contractor and incorporated in the Trade Contract Work. The Trade Contractor shall defend, indemnify and hold the Owner harmless from all suits or claims for infringement of any patent rights or copyrights arising out of such selection. The Owner agrees to indemnify and hold the Trade Contractor harmless from any suits or claims of infringement of any patent rights or copyrights arising out of any patented or copyrighted materials, methods or systems specified by the Owner, Construction Manager and Design Professional. To the extent portions of this paragraph are in conflict with SF 396 (codified at Iowa Code Section 537A.5) said portions are void and unenforceable.

3.22 CONFIDENTIALITY The Owner shall treat as confidential information all of the Trade Contractor's estimating systems and historical and parameter cost data that may be disclosed to the Owner in connection with the performance of this Agreement if they are specified and marked as confidential and shall mark them. If a document is not marked as "Confidential" it will not be treated as such. Nothing contained herein, however, shall be interpreted in a manner that modifies or is in conflict with the purpose and application of the open records laws contained in the Code of Iowa.

ARTICLE 4 OWNER'S RESPONSIBILITIES

4.1 INFORMATION SERVICES

4.1.1 FULL INFORMATION Any information or services to be provided by the Owner shall be provided in a timely manner so as not to delay the Trade Contract Work.

4.1.2 FINANCIAL INFORMATION Upon the written request of the Trade Contractor, the Owner shall provide the Trade Contractor with evidence of Project financing. If requested in writing, evidence of such financing shall be a condition precedent to the Trade Contractor's commencing or continuing the Trade Contract Work. The Trade Contractor shall be notified by the Owner prior to any material change in Project financing.

4.1.3 WORKSITE INFORMATION Except to the extent that the Trade Contractor knows of any inaccuracy, the Trade Contractor is entitled to rely on Worksite information furnished by the Owner pursuant to this subsection. To the extent the Owner has obtained, or is required elsewhere in the

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Trade Contract Documents to obtain, the following Worksite information, the Owner shall provide at the Owner's expense and with reasonable promptness:

4.1.3.1 information describing the physical characteristics of the site, including surveys, site evaluations, legal descriptions, data or drawings depicting existing conditions, subsurface conditions and environmental studies, reports and investigations;

4.1.3.2 tests, inspections and other reports dealing with environmental matters, Hazardous Material and other existing conditions, including structural, mechanical and chemical tests, required by the Trade Contract Documents or by law; and

4.1.3.3 any other information or services requested in writing by the Trade Contractor which are relevant to the Trade Contractor's performance of the Trade Contract Work and under the Owner's control. The information required by subsection 4.1.3 shall be provided in reasonable detail. Legal descriptions shall include easements, title restrictions, boundaries, and zoning restrictions. Worksite descriptions shall include existing buildings and other construction and all other pertinent site conditions. Adjacent property descriptions shall include structures, streets, sidewalks, alleys, and other features relevant to the Trade Contract Work. Utility details shall include available services, lines at the Worksite and adjacent and connection points. The information shall include public and private information, subsurface information, grades, contours, and elevations, drainage data, exact locations and dimensions, and benchmarks that can be used by the Trade Contractor in laying out the Trade Contract Work. The Trade Contractor shall in writing request from the Owner any information identified in Paragraph 4.1.3 that the Trade Contractor believes the Owner has obtained but has not provided to the Trade Contractor.

4.1.3.4 OWNER'S REPRESENTATIVE The Owner's representative is test. The Owner's representative shall have authority to bind the Owner in all matters relating to this Agreement including, without limitation, all matters requiring the Owner's approval, authorization or written notice. If the Owner changes its representative as listed above, the Owner shall notify the Trade Contractor in advance in writing. The Owner's Representative is also authorized to resolve disputes in accordance with Section 12.2 of this Agreement. The Construction Manager, while unauthorized to modify the Agreement or settle a dispute without the Owner's approval, however, does have the requisite authority to act as the Owner's agent throughout the construction of the Project in accordance with the contract between the Owner and the Construction Manager (ConsensusDOCS 801 as modified by the State of Iowa).

4.2 BUILDING PERMIT, FEES AND APPROVALS Except for those permits and fees related to the Trade Contract Work which are the responsibility of the Trade Contractor pursuant to subsection 3.16.1, the Owner shall secure and pay for all other permits, approvals, easements, assessments and fees required for the development, construction, use or occupancy of permanent structures or for permanent changes in existing facilities, including the building permit.

4.3 Deleted

4.4 TRADE CONTRACT DOCUMENTS Unless otherwise specified, Owner shall provide One (1) copies of the Trade Contract Documents to the Trade Contractor without cost. Additional copies will be provided to the Trade Contractor at cost. This paragraph is not intended to be in conflict with Iowa Code Section 26.3 requirement that a sufficient number of copies of the contract documents be made available to bidders without charge (but a deposit not to exceed $250 per set may be required). If the Trade Contractor was required to make a deposit for a set of Trade Contract Documents for purposes of bidding then the Trade Contractor may elect to have the deposit returned instead of being provided with an additional copy.

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4.4.1 DIGITIZED DOCUMENTS If the Owner requires that the Owner, Design Professional, Construction Manager and Trade Contractor exchange documents and data in electronic or digital form, prior to any such exchange, the Owner, Design Professional, Construction Manager and Trade Contractor shall agree on a written protocol governing all exchanges in ConsensusDocs 200.2 or a separate Agreement, which, at a minimum, shall specify: (a) the definition of documents and data to be accepted in electronic or digital form or to be transmitted electronically or digitally; (b) management and coordination responsibilities; (c) necessary equipment, software and services; (d) acceptable formats, transmission methods and verification procedures; (e) methods for maintaining version control; (f) privacy and security requirements; and (g) storage and retrieval requirements. Except as otherwise agreed to by the Parties in writing, the Parties shall each bear their own costs as identified in the protocol. In the absence of a written protocol, use of documents and data in electronic or digital form shall be at the sole risk of the recipient.

4.5 OWNER'S CUTTING AND PATCHING Cutting, patching or altering the Trade Contract Work by the Owner or Others shall be done with the prior written approval of the Trade Contractor, which approval shall not be unreasonably withheld.

4.6 OWNER'S RIGHT TO CLEAN UP In case of a dispute between the Trade Contractor and Others with regard to respective responsibilities for cleaning up at the Worksite, the Owner may implement appropriate cleanup measures after two (2) business Days' notice and allocate the cost among those responsible during the following pay period.

4.7 COST OF CORRECTING DAMAGED OR DESTROYED WORK With regard to damage or loss attributable to the acts or omissions of the Owner or Others and not to the Trade Contractor, the Owner may either (a) promptly remedy the damage or loss or (b) accept the damage or loss. If the Trade Contractor incurs additional costs or is delayed due to such loss or damage, the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price or Trade Contract Time.

ARTICLE 5 SUBCONTRACTS

5.1 SUBCONTRACTORS The Trade Contract Work not performed by the Trade Contractor with its own forces shall be performed by Subcontractors.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE TRADE CONTRACT WORK

5.2.0 The Trade Contractor must identify all Subcontractors and suppliers within 48 hours of the published date and time for which bids must be submitted, in accordance with Iowa Code Section 8A.311, as amended by House File 646 in 2011. Subcontractors and suppliers may not be changed without the approval of the Owner. Requests for changing a Subcontractor or supplier must identify the reason for the proposed change, the name of the new Subcontractor or supplier, and the change in the subcontractor or supplier price as a result of the change. Any reduction in subcontractor or supplier price as a result of the change, if the change is approved by the Owner, shall be deducted from the Trade Contract Price via a deductive Change Order. Any such changes, if approved by the Owner, which result in an increase in the Trade Contract Price shall be borne by the Trade Contractor.

5.2.1 If the Owner has a reasonable objection to any proposed subcontractor or material supplier, the Owner shall notify the Trade Contractor in writing.

5.2.2 If the Owner has reasonably and promptly objected as provided in subsection 5.2.1, the Trade Contractor shall not contract with the proposed subcontractor or material supplier, and the Trade Contractor shall propose another Subcontractor acceptable to the Owner. To the extent the substitution results in an increase or decrease in the Trade Contract Price or Trade Contract Time, an appropriate

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Trade Contract Change Order shall be issued as provided in ARTICLE 8.

5.3 BINDING OF SUBCONTRACTORS The Trade Contractor agrees to bind every Subcontractor (and require every Subcontractor to so bind its subcontractors) to all the provisions of this Agreement and the Trade Contract Documents as they apply to the Subcontractor's portion of the Trade Contract Work.

5.4 Deleted

5.5 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

5.5.1 If this Agreement is terminated, each subcontract agreement shall be assigned by the Trade Contractor to the Owner, subject to the prior rights of any surety, provided that:

5.5.1.1 this Agreement is terminated by the Owner pursuant to sections 11.3 or 11.4; and

5.5.1.2 the Owner accepts such assignment after termination by notifying the Subcontractor and Trade Contractor in writing, and assumes all rights and obligations of the Contractor pursuant to each subcontract agreement.

5.5.2 If the Owner accepts such an assignment, and the Work has been suspended for more than thirty (30) consecutive Days, following termination, if appropriate, the Subcontractor's compensation shall be equitably adjusted as a result of the suspension.

ARTICLE 6 TRADE CONTRACT TIME

6.1 PERFORMANCE OF THE TRADE CONTRACT WORK

6.1.1 DATE OF COMMENCEMENT The Date of Commencement is the date of Owner's written notice to proceed unless otherwise set forth below:

6.1.2 TIME Substantial Completion of the Trade Contract Work shall be achieved in XXX (XX) Days from the Date of Commencement. Unless otherwise specified in the Certificate of Substantial Completion, the Trade Contractor shall achieve Final Completion within 30 Days after the date of Substantial Completion, subject to adjustments as provided for in the Trade Contract Documents.

6.1.3 Time limits stated above are of the essence of this Agreement.

6.1.4 Unless instructed by the Owner in writing, the Trade Contractor shall not knowingly commence the Trade Contract Work before the effective date of insurance to be provided by the Trade Contractor and Owner as required by the Trade Contract Documents.

6.2 CONSTRUCTION SCHEDULE Prior to the commencement of the construction of the Trade Contract Work, the Trade Contractor shall submit a copy of its critical path method (CPM) construction schedule showing the completion of the Trade Contract Work within the allowable number of days identified above. The Trade Contractor shall regularly update its CPM construction schedule for the Trade Contract Work and promptly furnish the Construction Manager on an ongoing basis scheduling information requested by the Construction Manager for the Trade Contract Work. In consultation with the Trade Contractor, the Construction Manager shall incorporate the Trade Contract Work and work of other trade contractors into an overall Construction Schedule for the entire Project. The Trade Contractor shall be bound by the Construction. Nothing in this Trade Contractor Agreement shall relieve the Trade Contractor of any liability for any unexcused failure to comply with its original schedule, the Construction Schedule, or any completion dates. The Construction Manager shall have the right to coordinate the Trade Contractors, including the right, if necessary, to change the time, order and priority in which the various portions of the Trade Contract Work and the other work associated with the Project shall be performed.

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6.3 DELAYS AND EXTENSIONS OF TIME

6.3.1 If the Trade Contractor is delayed at any time in the commencement or progress of the Work by any cause beyond the control of the Trade Contractor, the Trade Contractor shall be entitled to an equitable extension of the Trade Contract Time if the Trade Contractor is able to show that the critical path of the Trade Contract Work was delayed by causes beyond the control of the Trade Contractor. Examples of causes beyond the control of the Trade Contractor include, but are not limited to, the following: acts or omissions of the Owner, the Design Professional, Construction Manager or Others; changes in the Work or the sequencing of the Work ordered by the Owner, or arising from decisions of the Owner that impact the time of performance of the Work; transportation delays not reasonably foreseeable; labor disputes not involving the Trade Contractor; general labor disputes impacting the Project but not specifically related to the Worksite; fire; terrorism, epidemics, adverse governmental actions, unavoidable accidents or circumstances; adverse weather conditions not reasonably anticipated; encountering Hazardous Materials; concealed or unknown conditions; delay authorized by the Owner pending dispute resolution; and suspension by the Owner under section 11.1. The Trade Contractor shall submit any requests for equitable extensions of Contract Time in accordance with the provisions of ARTICLE 8.

6.3.2 In addition, if the Trade Contractor is able to show that it incurred additional costs because the critical path of the Trade Contract Work was delayed by acts or omissions of the Owner, the Design Professional, Construction Manager or Others, changes in the Work or the sequencing of the Work ordered by the Owner, or arising from decisions of the Owner that impact the time of performance of the Work, encountering Hazardous Materials, or concealed or unknown conditions, delay authorized by the Owner pending dispute resolution or suspension by the Owner under section 11.1, then the Trade Contractor shall be entitled to an equitable adjustment in the Trade Contract Price subject to section 6.6.

6.3.3 NOTICE OF DELAYS In the event delays to the Trade Contract Work are encountered for any reason, the Trade Contractor shall provide prompt written notice to the Owner and the Construction Manager of the cause of such delays after Trade Contractor first recognizes the delay. The Owner and Trade Contractor agree to undertake reasonable steps to mitigate the effect of such delays.

6.4 NOTICE OF DELAY CLAIMS If the Trade Contractor believes it is due an equitable extension of Trade Contract Time or an equitable adjustment in Trade Contract Price as a result of a delay described in subsection 6.3.1, the Trade Contractor shall give the Owner and the Construction Manager written notice of the claim in accordance with section 8.4. If the Trade Contractor causes delay in the completion of the Trade Contract Work, the Owner shall be entitled to recover its additional costs subject to subsection 6.6. The Owner shall process any such claim against the Trade Contractor in accordance with ARTICLE 8.

6.5 LIQUIDATED DAMAGES

6.5.1 SUBSTANTIAL COMPLETION The Owner and the Trade Contractor agree that this Agreement ☐ shall / ☒ shall not (indicate one) provide for the imposition of liquidated damages based on the Date of Substantial Completion.

6.5.1.1 The Trade Contractor understands that if the Date of Substantial Completion established by this Agreement, as may be amended by subsequent Trade Change Order, is not attained, the Owner will suffer damages which are difficult to determine and accurately specify. The Trade Contractor agrees that if the Date of Substantial Completion is not attained the Trade Contractor shall pay the Owner Zero Dollars and No Cents ($0.00) as liquidated damages and not as a penalty for each day that Substantial Completion extends beyond the Date of Substantial Completion. The liquidated damages provided herein shall be in lieu of all liability for any and all

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extra costs, losses, expenses, claims, penalties and any other damages of whatsoever nature incurred by the Owner which are occasioned by any delay in achieving the Date of Substantial Completion.

6.5.2 FINAL COMPLETION The Owner and the Trade Contractor agree that this Agreement ☐ shall / ☒ shall not (indicate one) provide for the imposition of liquidated damages based on the Date of Final Completion.

6.5.2.1 The Trade Contractor understands that if the Date of Final Completion established by this Agreement, as may be amended by subsequent Trade Change Order is not attained, the Owner will suffer damages which are difficult to determine and accurately specify. The Trade Contractor agrees that if the Date of Final Completion is not attained the Trade Contractor shall pay the Owner Zero Dollars and No Cents ($0.00) as liquidated damages and not as a penalty for each day that Final Completion extends beyond the Date of Final Completion. The liquidated damages provided herein shall be in lieu of all liability for any and all extra costs, losses, expenses, claims, penalties and any other damages of whatsoever nature incurred by the Owner which are occasioned by any delay in achieving the Date of Final Completion.

6.5.3 OTHER LIQUIDATED DAMAGES The Owner and the Trade Contractor may agree upon the imposition of liquidated damages based on other project milestones or performance requirements. Such agreement shall be included as an exhibit to this Agreement.

6.6 LIMITED MUTUAL WAIVER OF CONSEQUENTIAL DAMAGES Except for damages mutually agreed upon by the Parties as liquidated damages in Section 6.5 and excluding losses covered by insurance required by the Trade Contract Documents, the Owner and the Trade Contractor agree to waive all claims against each other for any consequential damages that may arise out of or relate to this Agreement, except for those specific items of damages excluded from this waiver as mutually agreed upon by the Parties and identified below. The Owner agrees to waive damages including but not limited to the Owner's loss of use of the Project, any rental expenses incurred, loss of income, profit or financing related to the Project, as well as the loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of reputation, or insolvency. The Trade Contractor agrees to waive damages including but not limited to loss of business, loss of financing, principal office overhead and expenses, loss of profits not related to this Project, loss of bonding capacity, loss of reputation, or insolvency. The provisions of this section shall also apply to the termination of this Agreement and shall survive such termination.

6.6.1 The following items of damages are excluded from this mutual waiver: The provisions of this section shall also apply to the termination of this Agreement and shall survive such termination. The Owner and the Trade Contractor shall require similar waivers in contracts with Subcontractors and Others retained for the Project.

ARTICLE 7 TRADE CONTRACT PRICE

7.1 LUMP SUM As full compensation for performance by the Trade Contractor of the Work in conformance with the Contract Documents, the Owner shall pay the Trade Contractor the lump sum price of: XX dollars and XX cents ($XX.XX) . The lump sum price is hereinafter referred to as the Trade Contract Price, which shall be subject to increase or decrease as provided in article 8.

Lump Sum Price includes Base Bid of $X.XX and Alternate #XX for {alternate description} for $X.XX for a total Lump Sum Price of $X.XX.

7.2 ALLOWANCES

7.2.1 All allowances stated in the Trade Contract Documents shall be included in the Trade Contract Price. The Owner shall select allowance items in a timely manner so as not to delay the Trade Contract

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Work.

7.2.2 Allowances shall include the costs of materials, supplies and equipment delivered to the Worksite, less applicable trade discounts and including requisite taxes, unloading and handling at the Worksite, and labor and installation, unless specifically stated otherwise. The Trade Contractor's Overhead and profit for the allowances shall be included in the Trade Contract Price, but not in the allowances. The Trade Contract Price shall be adjusted by Trade Contract Change Order to reflect the actual costs when they are greater than or less than the allowances.

ARTICLE 8 CHANGES

Changes in the Trade Contract Work that are within the general scope of this Agreement shall be accomplished, without invalidating this Agreement, by Trade Contract Change Order, and Trade Contract Interim Directed Change.

8.1 TRADE CHANGE ORDER

8.1.1 The Owner may order or the Trade Contractor may request changes in the Trade Contract Work or the timing or sequencing of the Trade Contract Work that impacts the Trade Contract Price or the Trade Contract Time. All such changes in the Trade Contract Work that affect Trade Contract Time or Trade Contract Price shall in the form of a Trade Contract Change Order. Any such requests for a change in the Trade Contract Price or the Trade Contract Time shall be processed in accordance with this article 8. Trade Contract Change Orders shall be executed on the ConsensusDOCS 813 - Trade Contract Change Order (CM as Owner's Agent) with attachments as necessary.

8.1.2 The Owner, with the assistance of the Construction Manager, and the Trade Contractor shall negotiate in good faith an appropriate adjustment to the Trade Contract Price or the Trade Contract Time and shall conclude these negotiations as expeditiously as possible. Acceptance of the Trade Contract Change Order and any adjustment in the Trade Contract Price or Trade Contract Time shall not be unreasonably withheld.

8.2 TRADE CONTRACT INTERIM DIRECTED CHANGE

8.2.1 The Construction Manager may issue a written Trade Contract Interim Directed Change signed by the Owner directing a change in the Trade Contract Work prior to reaching agreement with the Trade Contractor on the adjustment, if any, in the Trade Contract Price or the Trade Contract Time.

8.2.2 The Owner, with the assistance of the Construction Manager, and the Trade Contractor shall negotiate expeditiously and in good faith for appropriate adjustments, as applicable, to the Trade Contract Price or the Trade Contract Time arising out of a Trade Contract Interim Directed Change. As the Trade Contract Changed Work is performed, the Trade Contractor shall submit its costs for such work with its application for payment beginning with the next application for payment within thirty (30) Days of the issuance of the Trade Contract Interim Directed Change. If there is a dispute as to the cost to the Owner, the Trade Contractor shall continue to perform the, Trade Contract Changed Work set forth in the Trade Contract Interim Directed Change and the Owner shall pay the requirements Trade Contractor the Cost of the Work, defined in 8.3.1.3 below upon receipt of an application for payment and the Owner's (and the Architect's and construction manger's) determination that the work has been completed. The Parties reserve their rights as to the disputed amount, subject to the requirements ARTICLE 12.

8.2.3 When the Owner and the Trade Contractor agree upon the adjustment in the Trade Contract Price or the Trade Contract Time, for a change in the Trade Contract Work directed by a Trade Contract Interim Directed Change, such agreement shall be the subject of a Trade Contract Change Order. The

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Trade Contract Change Order shall include all outstanding Trade Contract Interim Directed Changes on which the Owner and Trade Contractor have reached agreement on Contract Price or Contract Time issued since the last Trade Contract Change Order.

8.3 DETERMINATION OF COST

8.3.1 An increase or decrease in the Trade Contract Price or the Trade Contract Time resulting from a change in the Trade Contract Work shall be determined by one or more of the following methods:

8.3.1.1 unit prices set forth in this Agreement or as subsequently agreed;

8.3.1.2 a mutually accepted, itemized lump sum;

8.3.1.3 COST OF THE WORK Cost of the Work as defined by this subsection plus 10.0 % for Overhead and 5.0 % for profit. "Cost of the Work" shall include the following costs reasonably incurred to perform a change in the Work

8.3.1.3.1 wages paid for labor in the direct employ of the Constructor in the performance of the Work;

8.3.1.3.2 salaries of the Trade Contractor's employees when stationed at the field office to the extent necessary to complete the applicable Work, employees engaged on the road expediting the production or transportation of material and equipment, and supervisory employees from the principal or branch office performing the functions listed below;

8.3.1.3.3 cost of applicable employee benefits and taxes, including but not limited to, workers' compensation, unemployment compensation, social security, health, welfare, retirement and other fringe benefits as required by law, labor agreements, or paid under the Trade Contractor's standard personnel policy, insofar as such costs are paid to employees of the Trade Contractor who are included in the Cost of the Work in subsections .1 and .2 immediately above;

8.3.1.3.4 reasonable transportation, travel, and hotel expenses of the Trade Contractor's personnel incurred in connection with the Work;

8.3.1.3.5 cost of all materials, supplies, and equipment incorporated in the Work, including costs of inspection and testing if not provided by the Owner, transportation, storage, and handling;

8.3.1.3.6 payments made by the Trade Contractor to Subcontractors for Work performed under this Agreement;

8.3.1.3.7 cost, including transportation and maintenance of all materials, supplies, equipment, temporary facilities, and hand tools not owned by the workers that are used or consumed in the performance of the Work, less salvage value or residual value; and cost less salvage value of such items used, but not consumed that remain the property of the Trade Contractor;

8.3.1.3.8 rental charges of all necessary machinery and equipment, exclusive of hand tools owned by workers, used at the Worksite, whether rented from the Trade Contractor or Others, including installation, repair and replacement, dismantling, removal, maintenance, transportation, and delivery costs. Rental from unrelated third parties shall be reimbursed at actual cost. Rentals from the Trade Contractor or its affiliates, subsidiaries, or related parties shall be reimbursed at the prevailing rates in the locality of the Worksite up to eighty-five percent (85%) of the value of the piece of equipment;

8.3.1.3.9 cost of the premiums for all insurance and surety bonds which the Trade Contractor is

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required to procure or deems necessary, and approved by the Owner including any additional premium incurred as a result of any increase in the cost of the Work;

8.3.1.3.10 sales, use, gross receipts or other taxes, tariffs, or duties related to the Work for which the Trade Contractor is liable;

8.3.1.3.11 permits, fees, licenses, tests, and royalties;

8.3.1.3.12 reproduction costs, photographs, facsimile transmissions, long-distance telephone calls, data processing costs and services, postage, express delivery charges, data transmission, telephone service, and computer-related costs at the Worksite to the extent such items are used and consumed in the performance of the Work or are not capable of use after completion of the Work;

8.3.1.3.13 all water, power, and fuel costs necessary for the Work;

8.3.1.3.14 cost of removal of all nonhazardous substances, debris, and waste materials;

8.3.1.3.15 all costs directly incurred to perform a change in the Work which are reasonably inferable from the Contract Documents for the Changed Work;

8.3.1.3.16 DISCOUNTS All discounts for prompt payment shall accrue to the Owner to the extent such payments are made directly by the Owner. To the extent payments are made with funds of the Constructor, all cash discounts shall accrue to the Constructor. All trade discounts, rebates and refunds, and all returns from sale of surplus materials and equipment, shall be credited to the Cost of the Work;

8.3.1.3.17 COST REPORTING The Trade Contractor shall maintain in conformance with generally accepted accounting principles a complete and current set of records that are prepared or used by the Trade Contractor to calculate the Cost of Work. The Owner and Construction Manager shall be afforded access to the Trade Contractor's records, books, correspondence, instructions, drawings, receipts, vouchers, memoranda and similar data relating to requested payment for Cost of the Work. The Trade Contractor shall preserve all such records for a period of three years after the final payment or longer where required by law;

8.3.1.3.18 COST AND SCHEDULE ESTIMATES The Trade Contractor shall use reasonable skill and judgment in the preparation of a cost estimate or schedule for a change to the Work, but does not warrant or guarantee their accuracy

8.3.1.4 If an increase or decrease cannot be agreed to as set forth in Clauses .1 through .3 above, and the Owner or the Construction Manager issues a Trade Contract Interim Directed Change, the cost of the change in the Trade Contract Work shall be determined by the reasonable actual expense and savings of the performance of the Work resulting from the change. If there is a net increase in the Trade Contract Price, the Trade Contractor's Fee shall be adjusted accordingly. In case of a net decrease in the Trade Contract Price, the Trade Contractor's Fee shall not be adjusted unless ten percent (10%) or more of the Project is deleted. The Trade Contractor shall maintain a documented, itemized accounting evidencing the expenses and savings.

8.3.2 If unit prices are set forth in the Trade Contract Documents or are subsequently agreed to by the Parties, but the character or quantity of such unit items as originally contemplated is so different in a proposed Trade Change Order that the original unit prices will cause substantial inequity to the Owner or the Trade Contractor, such unit prices shall be equitably adjusted.

8.4 CLAIMS FOR ADDITIONAL COST OR TIME Except as provided in subsection 6.3.2 and section 6.4 for

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any claim for an increase in the Trade Contract Price or the Trade Contract Time, the Trade Contractor shall give the Owner and the Construction Manager written notice of the claim within fourteen (14) Days after the occurrence giving rise to the claim or within fourteen (14) Days after the Trade Contractor first recognizes (or should have recognized) the condition giving rise to the claim, whichever is later. Except in an emergency, notice shall be given before proceeding with the Trade Contract Work. Thereafter, the Trade Contractor shall submit written documentation of its claim, including appropriate supporting documentation, within twenty-one (21) Days after giving notice, unless the Parties mutually agree upon a period of time. The Owner or Construction Manager shall respond in writing denying or approving the Trade Contractor's claim no later than fourteen (14) Days after receipt of the Trade Contractor's claim. Any change in the Trade Contract Price or the Trade Contract Time resulting from such claim shall be authorized by Trade Contract Change Order.

ARTICLE 9 PAYMENT

9.1 GENERAL PROVISIONS Within fourteen (14) calendar Days from the date of execution of this Agreement, the Trade Contractor shall prepare and submit to the Construction Manager for approval a Schedule of Values apportioned to the various divisions or phases of the Trade Contract Work. Each line item contained in the Schedule of Values shall be assigned a monetary price such that the total of all such items shall equal the Trade Contract Price. The Schedule of Values shall be prepared in such detail and be supported by such documents and proof as may be required by the Construction Manager.

9.2 PROGRESS PAYMENTS

9.2.1 APPLICATIONS The Trade Contractor shall submit to the Construction Manager monthly notarized applications for payment. Trade Contractor's applications for payment shall be itemized and supported by the Trade Contractor's Schedule of Values and any other substantiating data as required by this Trade Contractor Agreement or requested by the Construction Manager or Design Professional. Payment applications may include payment requests on account of properly authorized Trade Contract Change Orders and Interim Directed Changes. The progress payment application shall include Trade Contract Work performed through the preceding calendar month. The Construction Manager will review the application and recommend to the Design professional and the Owner amounts payable by the Owner to the Trade Contractor. The Owner, in accordance with the determination of the Design Professional, shall pay the amount otherwise due on any payment application, less any amounts as set forth below, no later than thirty (30) calendar Days after the payment application, or portion thereof, is approved the Design Professional. The Owner may deduct, from any progress payment, such amounts as may be retained pursuant to subsection 9.2.4 below.

9.2.2 STORED MATERIALS AND EQUIPMENT Unless otherwise provided in the contract documents, applications for payment may include materials and equipment not yet incorporated into the Work but delivered to and suitably stored onsite or offsite including applicable insurance, storage and costs incurred transporting the materials to an offsite storage facility. Approval of payment applications for stored materials and equipment stored offsite shall be conditioned on submission by the Trade Contractor of bills of sale and proof of required insurance, or such other procedures satisfactory to the Owner to establish the proper valuation of the stored materials and equipment, the Owner's title to such materials and equipment, and to otherwise protect the Owner's interests therein, including transportation to the site.

9.2.3 CLAIM WAIVERS

9.2.3.1 PARTIAL CLAIMWAIVERS AND AFFIDAVITS As a prerequisite for payment, the Trade Contractor shall provide, in a form satisfactory to the Owner and the Construction Manager, partial claim waivers in the amount of the application for payment and affidavits from the Trade Contractor, and its Subcontractors, Material Suppliers for the completed Trade Contract Work.

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Such waivers shall be effective upon payment. In no event shall the Trade Contractor be required to sign an unconditional waiver of claim, either partial or final, prior to receiving payment or in an amount in excess of what it has been paid.

9.2.4 RETAINAGE From each progress payment made to the Trade Contractor has the Owner shall retain FIVE (5) percent of the amount otherwise due after deduction of any amounts as provided in section 9.3 and in no event shall such percentage exceed any applicable statutory requirements of this Agreement. Retainage shall be withheld and administered in accordance with Iowa Code Chapter 572:

9.3 ADJUSTMENT OF TRADE CONTRACTOR'S PAYMENT APPLICATION The Owner or the Construction Manager, upon notification of the Design Professional, may reject or adjust a Trade Contractor payment application or nullify a previously approved Trade Contractor payment application, in whole or in part, as may reasonably be necessary to protect the Owner from loss or damage based upon the following, to the extent that the Trade Contractor is responsible therefor under this Trade Contractor Agreement:

9.3.1 the Trade Contractor's repeated failure to perform the Trade Contract Work as required by the Trade Contractor Agreement;

9.3.2 loss or damage arising out of or relating to the Trade Contractor Agreement and caused by the Trade Contractor to the Owner, or to the Construction Manager or others to whom the Owner may be liable;

9.3.3 the Trade Contractor's failure to properly pay for labor, materials, equipment or supplies furnished in connection with the Trade Contract Work;

9.3.4 nonconforming or defective Trade Contract Work which has not been corrected in a timely fashion;

9.3.5 reasonable evidence of delay in performance of the Trade Contract Work such that the work will not be completed within the Trade Contract Time, and that the unpaid balance of the Trade Contract Price is not sufficient to offset any liquidated damages or actual damages that may be sustained by the Owner as a result of the anticipated delay caused by the Trade Contractor;

9.3.6 reasonable evidence demonstrating that the unpaid balance of the Trade Contract Price is insufficient to cover the cost to complete the Trade Contract Work; and

9.3.7 third-party claims involving the Trade Contractor or reasonable evidence demonstrating that third-party claims are likely to be filed unless and until the Trade Contractor furnishes the Owner with adequate security in the form of a surety bond, letter of credit or other collateral or commitment which are sufficient to discharge such claims if established. No later than thirty (30) Days after receipt of an application for payment, the Owner or Construction Manager shall give written notice to the Trade Contractor, disapproving or nullifying it or a portion thereof, specifying the reasons for the disapproval or nullification. When the above reasons for disapproving or nullifying an application for payment are removed, payment will be made for amounts previously withheld.

9.4 PAYMENT NOT ACCEPTANCE Payment to the Trade Contractor does not constitute or imply acceptance of any portion of the Trade Contract Work.

9.5 PAYMENT DELAY If for any reason not the fault of the Trade Contractor, the Trade Contractor does not receive a progress payment from the Owner sixty (60) calendar Days after the time such payment is due, as defined in Subparagraph 9.2.1, then the Trade Contractor, upon giving within seven (7) calendar Days after written notice to the Owner, and without prejudice to and in addition to any other legal remedies, may stop its Trade Contract Work until payment of the full amount owing to the Trade Contractor has been received. The

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Trade Contract Price and Trade Contract Time shall be equitably adjusted by a Trade Contract Change Order to reflect reasonable cost and delay resulting from shutdown, delay and start-up.

9.6 SUBSTANTIAL COMPLETION

9.6.1 The Trade Contractor shall notify the Owner, the Construction Manager and the Design Professional when it considers Substantial Completion of the Trade Contract Work or a designated portion to have been achieved. The Construction Manager and the Design Professional shall promptly conduct an inspection to determine whether the Trade Contract Work or designated portion can be occupied or utilized for its intended use by the Owner without excessive interference in completing any remaining unfinished Trade Contract Work by the Trade Contractor. If the Construction Manager and the Design Professional determine that the Trade Contract Work or designated portion has not reached Substantial Completion, the Design Professional, and the Construction Manager, shall promptly compile a list of items to be completed or corrected so the Owner may occupy or utilize the Trade Contract Work or designated portion for its intended use. The Trade Contractor shall promptly complete all items on the list.

9.6.2 When Substantial Completion of the Trade Contract Work or a designated portion is achieved, the Construction Manager and the Design Professional shall prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, and the respective responsibilities of the Owner and Trade Contractor for interim items such as security, maintenance, utilities, insurance and damage to the Trade Contract Work. The Owner shall assume all responsibilities for items such as security, maintenance, utilities, and insurance, and damage to the Work. The certificate shall also list the items to be completed or corrected, and establish the time for their completion or correction. The Certificate of Substantial Completion shall be submitted to the Trade Contractor for written acceptance of responsibilities assigned in the Certificate.

9.6.3 Unless otherwise provided in the Certificate of Substantial Completion, warranties required by the Trade Contract Documents shall commence on the date of Substantial Completion of the Trade Contract Work or a designated portion.

9.6.4 Uncompleted items shall be completed by the Trade Contractor by the Final Completion date set forth in the Agreement and/or Construction Schedule. The Trade Contractor may request early release of retainage in accordance with Iowa Code Section 26.13. Payment for completed work and retainage shall be made in accordance with Iowa Code Chapters 26 and 573.

9.7 PARTIAL OCCUPANCY OR USE The Owner may occupy or use completed or partially completed portions of the Trade Contract Work when (a) the portion of the Trade Contract Work is designated in a Certificate of Substantial Completion, (b) appropriate insurer(s) consent to the occupancy or use, and (c) appropriate public authorities authorize the occupancy or use. Such partial occupancy or use shall constitute Substantial Completion of that portion of the Trade Contract Work.

9.8 FINAL PAYMENT

9.8.1 APPLICATION Upon acceptance of the Trade Contract Work by the Construction Manager, and approval by the Design Professional, and upon the Trade Contractor furnishing evidence of fulfillment of the Trade Contractor's obligations in accordance with the Trade Contract Documents, the Trade Contractor shall submit its application for final payment. The Construction Manager will review the Trade Contractor's final payment application and recommend to the Design Professional and the Owner an amount payable by the Owner to the Trade Contractor. The Design Professional shall then recommend an amount to be paid by the Owner. Final payment shall be made in accordance with Iowa Code Chapters 26 and 573.

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9.8.2 REQUIREMENTS Along with its application for final payment, the Trade Contractor shall furnish to the Construction Manager:

9.8.2.1 an affidavit that all payrolls, bills for materials and equipment, and other indebtedness connected with the Trade Contract Work for which the Owner or its property or the Construction Manager or the Owner's surety might in any way be liable, have been paid or otherwise satisfied;

9.8.2.2 consent of the Trade Contractor's surety to final payment;

9.8.2.3 satisfaction of closeout procedures as may be required by the Trade Contractor Agreement;

9.8.2.4 certification(or other writing indicating) that insurance required by the Trade Contractor Agreement is and will remain effect beyond final payment pursuant to this Trade Contractor Agreement and

9.8.2.5 other data if required by the Owner or Construction Manager, such as receipts, releases, and waivers of liens effective upon payment to the extent and in such form as may be designated by the Owner or Construction Manager. Acceptance of final payment by the Trade Contractor shall constitute a waiver of all claims by the Trade Contractor except those previously made in writing and identified by the Trade Contractor as unsettled at the time of final application for payment.

9.8.3 TIME OF PAYMENT Final payment of the balance of the Trade Contract Price, less any amount retained pursuant to subsection 9.2.4 of this Agreement, and as required by Iowa Code Chapters 26 and 573, which among other things requires that twice the amount of an Iowa Code Chapter 573 subcontractor claim be withheld from final payment, shall be made to the Trade contractor within sixty (60) Days after the Trade Contractor has submitted a complete and accurate application for final payment.

9.8.4 LATE PAYMENT INTEREST Progress payments or final payment due and unpaid under this Trade Contractor Agreement shall bear interest from the date payment is due at the statutory rate prevailing at the place of the Project.

9.9 PAYMENT USE AND VERIFICATION The Trade Contractor is required to pay for all labor, materials and equipment used in the performance of the Trade Contract Work through the most current period applicable to progress payments received. Reasonable evidence, satisfactory to the Construction Manager, may be required to show that all obligations relating to the Trade Contract Work are current before releasing any payment due on the Trade Contract Work. If required by the Construction Manager, before final payment is made for the Trade Contract Work, the Trade Contractor shall submit evidence satisfactory to the Construction Manager that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Trade Contract Work, have been paid or otherwise satisfied as set forth in subsection 9.8.2.

ARTICLE 10 INDEMNITY, INSURANCE, WAIVERS AND BONDS

10.1 INDEMNITY

10.1A To the extent portions of this Article are in conflict with SF 396 (codified at Iowa Code Section 573A.5) said portions are void and unenforceable.

10.1.1 TRADE CONTRACTOR'S INDEMNITY To the fullest extent permitted by law, the Trade Contractor shall indemnify and hold harmless the Owner, the Owner's officers, directors, members,

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consultants, agents and employees, from all claims for bodily injury and property damage, other than to the Work itself and other property insured under subsection 10.3.1, including reasonable attorneys' fees, costs and expenses, that may arise from the performance of the Work, but only to the extent caused by the negligent acts or omissions of the Trade Contractor, Subcontractors or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable. The Trade Contractor shall be entitled to reimbursement of any defense costs paid above the Trade Contractor's percentage of liability for the underlying claim to the extent provided for under subsection 10.1.2.

10.1.2 OWNER'S INDEMNITY To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Trade Contractor, its officers, directors, members, consultants, agents, and employees, from all claims for bodily injury and property damage, other than property insured under subsection 10.3.1, including reasonable attorneys' fees, costs and expenses, that may arise from the performance of work by Owner, Design Professional or Others, but only to the extent caused by the negligent acts or omissions of the Owner, Design Professional or Others. The Owner shall be entitled to reimbursement of any defense costs paid above Owner's percentage of liability for the underlying claim to the extent provided for under subsection 10.1.1.

10.1.3 CONSTRUCTION MANAGER AND DESIGN PROFESSIONAL INDEMNITY The Owner shall cause the Construction Manager and the Design Professional to agree to indemnify and hold harmless the Owner from all claims for bodily injury and property damage, other than to the Work itself and other property insured under section 10.3, that may arise from the Construction Manager's or the Design Professional's services, but only to the extent that such claims result from the negligent acts or omissions of the Construction Manager or the Design Professional, respectively, or anyone for whose acts or omissions the Construction Manager or Design Professional, respectively, is liable. Such provisions shall be in a form no less protective of the Parties than the Construction Manager's Indemnity provided in ConsensusDocs 801 (2011) or the Design Professional's indemnity provided in ConsensusDocs 803 (2011) respectively, and shall be reasonably satisfactory to the Owner and the Trade Contractor.

10.1.4 ADJACENT PROPERTY INDEMNIFICATION To the extent of the limits of Trade Contractor's Commercial General Liability Insurance specified in subsection 10.2.1 or Zero Dollars and No Cents ($0.00) whichever is more, the Trade Contractor shall indemnify and hold harmless the Owner against any and all liability, claims, demands, damages, losses and expenses, including attorney's fees, in connection with or arising out of any damage or alleged damage to any of Owner's existing adjacent property that may arise from the performance of the Trade Contract Work, but only to the extent of the negligent acts or omissions of the Trade Contractor, Subcontractor or anyone employed directly or indirectly by any of them or by anyone for whose acts any of them may be liable.

10.1.5 NO LIMITATION ON LIABILITY In any and all claims against the Indemnitees by any employee of the Trade Contractor, anyone directly or indirectly employed by the Trade Contractor or anyone for whose acts the Trade Contractor may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Trade Contractor under Workers' Compensation acts, disability benefit acts or other employment benefit acts.

10.2 TRADE CONTRACTOR'S INSURANCE

10.2.1 Prior to the start of the Work, the Trade Contractor shall procure and maintain in force Workers Compensation/Employers' Liability Insurance, Business Automobile Liability Insurance, and Commercial General Liability Insurance (CGL). The CGL policy shall include coverage for liability arising from premises, operations, independent contractors, products-completed operations, personal injury and

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advertising injury, contractual liability, and broad form property damage. The Trade Contractor's liability policies, as required in this Subparagraph 10.2.1, shall be written on an occurrence basis with at least the following limits of liability:

10.2.1.1 Workers' Compensation- amount required by the laws of Iowa

10.2.1.2 Employers' Liability Insurance - $500,000 or an amount required by Iowa law, whichever is greater.

10.2.1.3 Business Automobile Liability Insurance

a. $1,000,000 Each Accident

10.2.1.4 Commercial General Liability Insurance

a. $1,000,000 Each Occurrence b. $2,000,000 General Aggregate c. $1,000,000 Products/Completed Operations Aggregate d. $1,000,000 Personal and Advertising Injury Limit

10.2.2 The Trade Contractor Must also carry and maintain Excess or Umbrella Liability coverage for the policies in subsection 10.2.1 in the amounts as listed below:

Trade Contractor Contract Amount: <$1,000,000 - $2 Million Umbrella or more $1,000,000 - $5,000,000 - $5 Million Umbrella or more >$5,000,000 - $10 Million Umbrella or more

10.2.3 The Trade Contractor shall maintain in effect all insurance coverage required under subsection 10.2.1 with insurance companies lawfully authorized to do business in Iowa. Such insurance companies shall have a minimum A.M. Best Rating of A-VI (Consult instructions and insurance advisor).If the Trade Contractor fails to obtain or maintain any insurance coverage required under this Agreement, the Owner may purchase such coverage and charge the expense to the Trade Contractor, or terminate this Agreement.

10.2.4 To the extent commercially available, the policies of insurance required under Subparagraph 10.2.1 shall contain a provision that the insurance company or its designee must give the Owner written notice transmitted in paper or electronic format: (a) 30 days before coverage is nonrenewed by the insurance company and (b) with 10 business days after cancelation of coverage by the insurance company. The Trade Contractor shall maintain completed operations liability insurance for one year after acceptance of the Contract Documents, whichever is longer. Prior to commencement of services, the Trade Contract shall furnish the Owner with certificates evidencing the required coverages. In addition, if any insurance policy required under subsection 10.2.1 is not to be immediately replaced without a lapse in coverage when it expires, exhausts its limits, or is to be, cancelled, the Trade Contractor shall give Owner prompt written notice upon actual or constructive knowledge of such condition.

10.2.5 ADDITIONAL LIABILITY COVERAGE

10.2.5.1 The Owner [X] shall / [ ] shall not (indicate one) require the Trade Contractor to purchase and maintain liability coverage, primary to the Owner's coverage under subsection 10.3.1.

10.2.5.2 If required by subsection 10.2.5.1, the additional liability coverage required of the Trade Contractor shall be:

1. Additional Insured Owner shall be named as an additional insured on Trade Contractor's Commercial General Liability Insurance specified for operations and completed operations,

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but only with respect to liability for bodily injury, property damage or personal and advertising injury to the extent caused by the negligent acts or omissions of Trade Contractor, or those acting on Trade Contractor's behalf, in the performance of Trade Contractor's Work for.

2. OCP Trade Contractor shall provide an Owners' and Contractors' Protective Liability Insurance ("OCP") policy with limits equal to the limits on Commercial General Liability Insurance specified or limits as otherwise required by Owner.

Any documented additional cost in the form of a surcharge associated with procuring the additional liability coverage in accordance with this subsection shall be paid by the Owner directly or the costs may be reimbursed by the Owner to the Trade Contractor by increasing the Trade Contract Price to correspond to the actual cost required to purchase and maintain the additional liability coverage. Prior to commencement of the Work, the Trade Contractor shall obtain and furnish to the Owner a certificate evidencing that the additional liability coverages have been procured.

10.2.6 PROFESSIONAL LIABILITY INSURANCE To the extent the Trade Contractor is required to procure design services under this Agreement, in accordance with section 3.14, the Trade Contractor shall require the designers to obtain professional liability insurance for claims arising from the negligent performance of professional services under this Agreement, with a company reasonably satisfactory to the Owner, including coverage for all professional liability caused by any of the Designer's(s') consultants, written for not less than $1,000,000 per claim and in the aggregate with the deductible not to exceed $2,000,000. The deductible shall be paid by the Designer.

10.3 OWNER'S INSURANCE

10.3.1 Deleted.

10.3.2 Deleted.

10.4 PROPERTY INSURANCE

10.4.1 Before the start of Trade Contract Work, the Owner shall obtain and maintain Builder's Risk Policy insurance with minimum coverage limits equal to the full cost of replacement of the Project at the time of loss. This insurance shall also name the Trade Contractor, Subcontractors, Material Suppliers, Construction Manager and Design Professional as insureds. This insurance shall be written as a Builder's Risk Policy or equivalent form to cover all risks of physical loss except those specifically excluded by the policy, and shall insure at least against the perils of fire, lightning, explosion, windstorm, hail, smoke, aircraft and vehicles, riot and civil commotion, theft, vandalism, malicious mischief, debris removal, flood (subject to sublimits), earthquake (subject to sublimits), earth movement, water damage, wind damage, testing if applicable, collapse however caused, and shall include coverage for, material, or equipment stored offsite, onsite or in transit. This policy shall provide for a waiver of subrogation in favor of the Trade Contractor, Subcontractors, Material Suppliers, Construction Manager and Design Professional. This insurance shall remain in effect until the Substantial Completion of the Work, final payment has been made or until no person or entity other than the Owner has an insurable interest in the property to be covered by this insurance, whichever is sooner. Partial occupancy or use of the Work shall not commence until the Owner has secured the consent of the insurance company or companies providing the coverage required in this Subparagraph 10.4.1.

10.4.2 If the Owner does not intend to purchase the property insurance required by this Agreement, including all of the coverages and deductibles described herein, the Owner shall give written notice to the Trade Contractor, the Design Professional and the Construction Manager before the Trade Contract

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Work is commenced. The Trade Contractor may then provide insurance to protect its interests and the interests of the Subcontractors, including the coverage of deductibles. The cost of this insurance shall be charged to the Owner in a Change Order. The Owner shall be responsible for all of Trade Contractor's costs reasonably attributed to the Owner's failure or neglect in purchasing or maintaining the coverage described above.

10.4.2.1 The Owner will not obtain insurance to cover the risk of physical loss resulting from Terrorism. The Construction Manager is not required to purchase this type of insurance but may purchase this type of insurance if it chooses. f purchased, the cost of this insurance shall be borne by the Construction manager.

10.4.3 POLICIES The Owner shall provide the Trade Contractor with a copy of all policies including all endorsements upon request.

10.5 PROPERTY INSURANCE LOSS ADJUSTMENT

10.5.1 LOSS ADJUSTMENT Any insured loss shall be adjusted with the Owner and the Trade Contractor and made payable to the Owner as trustee for the insureds, as their interests may appear.

10.5.2 DISTRIBUTION OF PROCEEDS Following the occurrence of an insured loss, monies received will be deposited in a separate account and the trustee shall make distribution in accordance with the agreement of the Parties in interest.

10.6 WAIVERS

10.6.1 PROPERTY DAMAGE The Owner and Trade Contractor waive all claims and other rights they may have against each other for loss of or damage to (a) the Project, (b) all materials, machinery, equipment and other items used in accomplishing the Trade Contract Work or services or to be incorporated into the Project, while the same are in transit, at the Project Site, during erection and otherwise, and (c) all property owned by or in the custody of Owner and its affiliates, however such loss or damage shall occur, to be extent such damage is covered by property insurance. The proceeds of such insurance shall be held by the Owner as trustee.

10.6.2 WAIVER OF SUBROGATION The Owner shall have its insurers waive all rights of subrogation they may have against the Construction Manager, Design Professional, Trade Contractors, and their Subcontractors and Material Suppliers on all policies carried by the Owner on the Project and adjacent properties, including, after final payment, those policies to be provided on the completed Project not intended to insure the Project during construction.

10.6.3 ENDORSEMENT If the policies of insurance referred to in this section require an endorsement to provide for continued coverage where there is a waiver of subrogation, the Owner will cause them to be so endorsed.

10.7 RISK OF LOSS Except to the extent a loss is covered by propertyinsurance,carried by the owner, risk of loss or damage to the Work shall be upon the Trade Contractor until the Date of Final Completion, unless otherwise agreed to by the Parties.

10.8 BONDS Performance and Payment Bonds

☒ are

☐ are not

required of the Trade Contractor that meet the requirements of Iowa Code Chapter 573. A deposit in lieu of a

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bond may be acceptable if it meets the requirements of Iowa Code Section 573.4. Such bonds shall be issued by a surety admitted in the State in which the Project is located and must be acceptable to the Owner. The Owner's acceptance shall not be withheld without reasonable cause. The penal sum of the Payment Bond and of the Performance Bond shall each be one hundred percent (100%) of the original Contract Price. Any increase in the Contract Price that exceeds ten percent (10%) in the aggregate shall require a rider to the Bonds increasing penal sums accordingly. Up to such ten percent (10%) amount, the penal sum of the Bond shall remain equal to one hundred percent (100%) of the Contract Price. The Trade Contractor shall endeavor to keep its surety advised of changes potentially impacting the Contract Time and Contract Price, though the Trade Contractor shall require that its surety waives any requirement to be notified of any alteration or extension of time. The Trade Contractor's Payment Bond for the Project, if any, shall be made available by the Owner for review and copying by the Subcontractor. Iowa Code Chapter 573 shall control and take precedence over any conflicting term or condition in this Agreement

ARTICLE 11 SUSPENSION, NOTICE TO CURE AND TERMINATION OF AGREEMENT

11.1 SUSPENSION BY OWNER FOR CONVENIENCE

11.1.1 OWNER SUSPENSION Should the Owner order the Trade Contractor in writing to suspend, delay, or interrupt the performance of the Trade Contract Work for such period of time as may be determined to be appropriate for the convenience of the Owner and not due to any act or omission of the Trade Contractor or any person or entity for whose acts or omissions the Trade Contractor may be liable, then the Trade Contractor shall immediately suspend, delay or interrupt that portion of the Trade Contract Work as ordered by the Owner. The Trade Contract Price and the Trade Contract Time shall be equitably adjusted by Trade Contract Change Order for the cost and delay resulting from any such suspension.

11.1.2 Any action taken by the Owner that is permitted by any other provision of the Trade Contract Documents and that results in a suspension of part or all of the Trade Contract Work does not constitute a suspension of Trade Contract Work under this section.

11.2 NOTICE TO CURE A DEFAULT If the Trade Contractor persistently refuses or fails to supply enough properly skilled workers, proper materials, or equipment to maintain the approved Construction Schedule in accordance with ARTICLE 6, or fails to make prompt payment to its workers, Subcontractors or Material Suppliers; disregards laws, ordinances, rules, regulations or orders of any public authority having jurisdiction; or is otherwise guilty of a material breach of a provision of this Agreement, the Trade Contractor may be deemed in default. If the Trade Contractor fails within seven (7) business Days after receipt of written notification to commence and continue satisfactory correction of such default with diligence and promptness, then the Owner shall give the Trade Contractor a second notice to correct the default within a three (3) Day period. If the Trade Contractor fails to promptly commence and continue satisfactory correction of the default following receipt of such second notice, the Owner without prejudice to any other rights or remedies may:

11.2.1 supply workers and materials, equipment and other facilities as the Owner or Construction Manager deems necessary for the satisfactory correction of the default, and charge the cost to the Trade Contractor, who shall be liable for the payment of same including reasonable Overhead, profit and attorneys' fees;

11.2.2 contract with Others to perform such part of the Trade Contract Work as the Owner or Construction Manager determines shall provide the most expeditious correction of the default, and charge the cost to the Trade Contractor;

11.2.3 withhold payment due the Trade Contractor in accordance with section 9.3; and

11.2.4 in the event of an emergency affecting the safety of persons or property, immediately commence

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and continue satisfactory correction of such default as provided in subsections 11.2.1 and 11.2.2 without first giving written notice to the Trade Contractor, but shall give prompt written notice of such action to the Trade Contractor following commencement of the action.

11.3 OWNER'S RIGHT TO TERMINATE FOR DEFAULT

11.3.1 TERMINATION BY OWNER FOR DEFAULT If, within seven (7) Days of receipt of a notice to cure pursuant to section 11.2, the Trade Contractor fails to commence and satisfactorily continue correction of the default set forth in the notice to cure, the Owner may notify the Trade Contractor that it intends to terminate this Agreement for default absent appropriate corrective action within fourteen additional Days. After the expiration of the additional fourteen (14) Day period, the Owner may terminate this Agreement by written notice absent appropriate corrective action. Termination for default is in addition to any other remedies available to Owner under section 11.2. If the Owner's cost arising out of the Trade Contractor's failure to cure, including the cost of completing the Trade Contract Work and reasonable attorneys' fees, exceeds the unpaid Trade Contract Price, the Trade Contractor shall be liable to the Owner for such excess costs. If the Owner's costs are less than the unpaid Trade Contract Price, the Owner shall pay the difference to the Trade Contractor. In the event the Owner exercises its rights under this section, upon the request of the Trade Contractor the Owner shall furnish to the Trade Contractor a detailed accounting of the cost incurred by the Owner.

11.3.2 USE OF TRADE CONTRACTOR'S MATERIALS, SUPPLIES AND EQUIPMENT If the Owner or Others perform work under this section, the Owner shall have the right to take and use any materials, supplies and equipment belonging to the Trade Contractor and located at the Worksite for the purpose of completing any remaining Trade Contract Work. Immediately upon completion of the Work, any remaining materials, supplies or equipment not consumed or incorporated in the Trade Contract Work shall be returned to the Trade Contractor in substantially the same condition as when they were taken, reasonable wear and tear excepted.

11.3.3 If the Trade Contractor files a petition under the Bankruptcy Code, this Agreement may be terminated for cause at the may be terminated for cause at the Owner.

11.3.3 If the Trade Contractor files a petition under the Bankruptcy Code, this Agreement may be terminated for cause at the may be terminated for cause at the Owner.

11.3.4 The Owner shall make reasonable efforts to mitigate damages arising from Trade Contractor default, and shall promptly invoice the Trade Contractor for all amounts due pursuant to sections 11.2 and 11.3.

11.4 TERMINATION BY OWNER FOR CONVENIENCE

11.4.1 Upon written notice to the Trade Contractor, the Owner may, without cause, terminate this Agreement. The Trade Contractor shall immediately stop the Work, follow the Owner's or Construction Manager's instructions regarding shutdown and termination procedures, and strive to minimize any further costs.

11.4.2 If the Owner terminates this Agreement pursuant to this section, the Trade Contractor shall be paid:

11.4.2.1 for the Work performed to date including Overhead and profit; and

11.4.2.2 for all demobilization costs and costs incurred as a result of the termination but not including Overhead or profit on work not performed;

11.4.2A Upon written notice to the Trade Contractor the Owner has the right to terminate this

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Agreement without penalty as a result of the following: 1) the legislature or governor fail to appropriate funds sufficient to allow the Owner to operate as required and fulfill its obligations under this Agreement, 2) funds are de-appropriated or not allocated, 3) the Owner's authorization to operate is withdrawn or there is a material alteration in the programs administered by the owner, or 4) the Owner's duties are substantially modified. If such a termination results then the Trade Contractor shall be paid in the manner set forth in subparagraph 11.4.2. If, however, an appropriation to cover the cost of this Agreement becomes available within sixty (60) days subsequent to termination under this paragraph then the Owner agrees to re-enter into a modified version of this Agreement that accounts for the termination and reinstatement.

11.4.3 If the Owner terminates this Agreement pursuant to sections 11.3 or 11.4, the Trade Contractor shall:

11.4.3 If the Owner terminates this Agreement pursuant to sections 11.3 or 11.4, the Trade Contractor shall:

11.4.3.1 execute and deliver to the Owner all papers and take all action required to assign, transfer and vest in the Owner the rights of the Trade Contractor to all materials, supplies and equipment for which payment has or will be made in accordance with the Trade Contract Documents and all subcontracts, orders and commitments which have been made in accordance with the Trade Contract Documents;

11.4.3.2 exert reasonable effort to reduce to a minimum the Owner's liability for subcontracts, orders and commitments that have not been fulfilled at the time of the termination;

11.4.3.3 cancel any subcontracts, orders and commitments as the Owner or Construction Manager directs; and

11.4.3.4 sell at prices approved by the Owner or Construction Manager any materials, supplies and equipment as the Owner or Construction Manager directs, with all proceeds paid or credited to the Owner.

11.5 TRADE CONTRACTOR'S RIGHT TO TERMINATE

11.5.1 Upon seven (7) Days' written notice to the Owner and Construction Manager, the Trade Contractor may terminate this Agreement if the Trade Contract Work has been stopped for a thirty (30) Day period through no fault of the Trade Contractor for any of the following reasons:

11.5.1.1 under court order or order of other governmental authorities having jurisdiction;

11.5.1.2 as a result of the declaration of a national emergency or other governmental act during which, through no act or fault of the Trade Contractor, materials are not available; or

11.5.1.3 suspension by the Owner for convenience pursuant to section 11.1

11.5.2 In addition, upon seven (7) Days' written notice to the Owner and Construction Manager, the Trade Contractor may terminate the Agreement if the Owner:

11.5.2.1 fails to furnish reasonable evidence pursuant to section 4.1.2 that sufficient funds are available and committed for Project financing, or

11.5.2.2 assigns this Agreement over the Trade Contractor's reasonable objection, or

11.5.2.3 fails to pay the Trade Contractor in accordance with this Agreement and the Trade Contractor has complied with the notice provisions of section 9.5, or

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11.5.2.4 otherwise materially breaches this Agreement.

11.5.3 Upon termination by the Trade Contractor in accordance with this section, the Trade Contractor shall be entitled to recover from the Owner payment for all Trade Contract Work executed and for any proven loss, cost or expense in connection with the Trade Contract Work, including all demobilization costs plus reasonable Overhead and profit on work not performed.

11.6 OBLIGATIONS ARISING BEFORE TERMINATION Even after termination pursuant to ARTICLE 11, the provisions of this Agreement still apply to any Trade Contract Work performed, payments made, events occurring, costs charged or incurred or obligations arising before the termination date.

ARTICLE 12 DISPUTE MITIGATION AND RESOLUTION

12.1 WORK CONTINUANCE AND PAYMENT Unless otherwise agreed in writing, the Trade Contractor shall continue the Trade Contract Work and maintain the Construction Schedule during any dispute mitigation or resolution proceedings. If the Trade Contractor continues to perform, the Owner shall continue to make payments in accordance with this Agreement.

12.2 DIRECT DISCUSSIONS If the Parties cannot reach resolution on a matter relating to or arising out of the Agreement, the Parties shall endeavor to reach resolution through good faith direct discussions between the Parties' representatives, who shall possess the necessary authority to resolve such matter and who shall record the date of first discussions. The authorized representative for the Trade Contractor is identified in Paragraph 3.4 of the Agreement. The authorized representative for the Owner is identified in Paragraph 4.2 of the Agreement. The parties' authorized representative are, among other things, authorized to resolve matters of disagreement and disputes between the Parties. If the dispute remains unresolved after fifteen (15) Days from the date of first discussion, the Parties shall submit such matter to the dispute mitigation and dispute resolution procedures selected herein.

12.3 MITIGATION The Parties agree that dispute mitigation procedures provided in this Project. Disputes remaining unresolved after direct discussions shall be directed to the selected mitigation procedure immediately below. The dispute mitigation procedure shall result in nonbinding finding on the matter. This may be introduced as evidence at a subsequent binding adjudication of the matter, as designee on Paragraph 12.5. The Parties agree that the dispute mitigation procedure shall be

(Designate only one.)

[X] Project Neutral

[ ] Dispute Review Board

12.3.1 MITIGATION PROCEDURES The Project Neutral/Dispute Review Board shall be mutually selected and appointed by the Parties and shall execute a retainer agreement with the Parties establishing the scope of the Project Neutral/Dispute Review Board's responsibilities. The costs and expenses of the Project Neutral/Dispute Review Board shall be shared equally by the Parties. The Project Neutral/Dispute Review Board shall be available to either Party, upon request, throughout the course of the Project, and shall make regular visits to the Project so as to maintain an up-to-date understanding of the Project progress and issues and to enable the Project Neutral/Dispute Review Board to address matters in dispute between the Parties promptly and knowledgeably. The Project Neutral/Dispute Review Board shall issue nonbinding findings within five (5) business Days of referral of the matter to the Project Neutral, unless good cause is shown.

12.3.2 If the matter remains unresolved following the issuance of the nonbinding finding by the mitigation procedure or if the Project Neutral/Dispute Review Board fails to issue nonbinding findings

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within five (5) Days of the referral, the Parties shall submit the matter to the binding dispute resolution procedure designated in section 12.5.

12.4 MEDIATION If direct discussions pursuant to section 12.2 do not result in resolution of the matter and no dispute mitigation procedure is selected under section 12.3, the Parties shall endeavor to resolve the matter by mediation through the current Construction Industry Mediation Rules of the American Arbitration Association, or the Parties may mutually agree to select another set of mediation rules. The administration of the mediation shall be as mutually agreed by the Parties. The mediation shall be convened within thirty (30) business Days of the matter first being discussed and shall conclude within forty-five (45) business Days of the matter first being discussed. Either Party may terminate the mediation at any time after the first session, but the decision to terminate shall be delivered in person by the terminating Party to the non-terminating Party and to the mediator. The costs of the mediation shall be shared equally by the Parties.

12.5 BINDING DISPUTE RESOLUTION If the matter is unresolved after submission of the matter to a mitigation procedure or to mediation, the Parties shall submit the matter to the binding dispute resolution procedure designated herein.

(Designate only one.)

☐ Arbitration using the current Construction Industry Arbitration Rules of the American Arbitration Association

☒ Litigation in either the state or federal court having jurisdiction of the matter in the location of the Project.

12.5.1 The costs of any binding dispute resolution procedures shall be borne by the non-prevailing Party, as determined by the adjudicator of the dispute. However, the costs of binding dispute resolution does not include attorney fees. The Parties are each responsible for paying for their own attorney fees.

12.5.2 VENUE The venue of any binding dispute resolution procedure shall be Des Moines, Iowa.

12.6 MULTIPARTY PROCEEDING All parties necessary to resolve a claim shall be parties to the same dispute resolution proceeding. Appropriate provisions shall be included in all other contracts relating to the Work to provide for the joinder or consolidation of such dispute resolution procedures.

12.7 LIEN RIGHTS The Trade Contractor acknowledges that it has no mechanic's lien rights on this Project because it is a public improvement project.

ARTICLE 13 MISCELLANEOUS PROVISIONS

13.1 ASSIGNMENT Neither the Owner nor the Trade Contractor shall assign their interest in this Agreement without the written consent of the other except as to the assignment of proceeds. The terms and conditions of this Agreement shall be binding upon both Parties, their partners, successors, assigns and legal representatives. Neither Party to this Agreement shall assign the Agreement as a whole without written consent of the other. If either Party attempts to make such an assignment, that Party shall nevertheless remain legally responsible for all obligations under this Agreement, unless otherwise agreed by the other Party.

13.2 GOVERNING LAW This Agreement and all disputes arising there from shall be governed by the Iowa law.

13.3 SEVERABILITY The partial or complete invalidity of any one or more provisions of this Agreement shall not affect the validity or continuing force and effect of any other provision.

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13.4 NO WAIVER OF PERFORMANCE The failure of either Party to insist, in any one or more instances, on the performance of any of the terms, covenants or conditions of this Agreement, or to exercise any of its rights, shall not be construed as a waiver or relinquishment of such term, covenant, condition or right with respect to further performance or any other term, covenant, condition or right.

13.5 TITLES AND GROUPINGS The titles given to the articles of this Agreement are for ease of reference only and shall not be relied upon or cited for any other purpose. The grouping of the articles in this Agreement and of the Owner's specifications under the various headings is solely for the purpose of convenient organization and in no event shall the grouping of provisions, the use of sections or the use of headings be construed to limit or alter the meaning of any provisions.

13.6 ASSISTANCE OF COUNSEL AND INTERPRETATION The Parties agree that they had the opportunity to obtain the assistance of counsel in reviewing the Agreement terms prior to execution. This Agreement shall be construed neither against nor in favor of either Party, but shall be construed in a neutral manner.

13.7 RIGHTS AND REMEDIES The Parties' rights, liabilities, responsibilities and remedies with respect to this Agreement, whether in contract, tort, negligence or otherwise, shall be exclusively those expressly set forth in this Agreement.

13.8 ADDITIONAL PROVISIONS (Insert here other provisions, if any, that pertain to this Agreement See Below.)

13.9 COMPLIANCE WITH LAW AND REGULATIONS The Trade Contractor shall comply with all applicable federal, state, and local laws, rules, ordinances, regulations and orders when performing services and/or performing work under this Agreement, including without limitation, all laws applicable to the prevention of discrimination in employment and the use of targeted small businesses as subcontractors or suppliers. The Trade Contractor declares that it has complied with all federal, state and local laws regarding business permits and licenses that may be required to provide the services and work required by this Agreement. The Trade Contractor further acknowledges that if this Project is a recipient of Federal financial assistance that it may be subject to requirements of Federal Acts and Executive Orders as mandated by Federal agencies having authority and jurisdiction to enforce and ensure compliance with such laws and regulations including, but not necessarily limited to, the Davis Bacon Act and other Federal Acts and Executive Orders.

13.10 EMPLOYMENT PRACTICES: It is the intent of the Iowa Department of Administrative Services to assure equal employment opportunity in all contract work as required by law. Vendors, are required to take affirmative action to ensure that applicants employed or seeking employment with them are treated equally as required by law. Vendors shall not illegally discriminate against any employee. During the course of the Project, the Vendor may be required to show compliance with the EEO and Affirmative Action requirements. Noncompliance with the provisions set forth at the time of contract award may result in termination or suspension of the Agreement in whole or in part. All vendors and service providers working under the terms of this Agreement are prohibited from engaging in discriminatory employment practices forbidden by Iowa law. Vendors shall complete and submit the Nondiscrimination Clause form for the Owner's approval.

13.11 RECIPROCAL BIDDER PREFERENCE In accordance with Iowa Code Section 73A.21, as amended in 2011 by HF 648, if the Trade Contractor is not a resident bidder of Iowa, as defined by law, then the Trade Contractor must specifically identify in writing with its bid any and all preferences or preferential treatment (including preferences related to labor) enforced by the state or foreign country in which the Trade Contractor is a resident. If the low bid Trade Contractor is not a resident bidder of Iowa and the Trade Contractor's foreign State of residence enforces such a preference then the Owner shall reciprocally enforce the preference in favor of a resident bidder of Iowa. Failure on the part of the Trade Contractor to completely and accurately abide by this legal requirement may, among other things, result in civil penalties and void this Agreement. The Trade Contractor should contact its attorney regarding this legal requirement if the Trade

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Contractor has questions regarding its meaning or application.

13.12 LABOR RELATIONS The Trade Contractor shall comply with all Iowa and Federal labor laws. In accordance with Executive Order Number 69, issued by the Governor of Iowa on or about January 14, 2011, no project labor agreement (also known as a PLA), or similar, will be used on this Project. Iowa is a right to work state. No consultant, contractor, or employee shall be obligated to contract with or join any labor organization as a condition of performing work on this Project.

ARTICLE 14 TRADE CONTRACT DOCUMENTS

14.1 The Trade Contract Documents in existence at the time of execution of this Agreement are as follows:

RFBXXXXXXXXX Bid Package X

14.2 INTERPRETATION OF TRADE CONTRACT DOCUMENTS

14.2.1 The drawings and specifications are complementary. If Trade Contract Work is shown only on one but not on the other, the Trade Contractor shall perform the Trade Contract Work as though fully described on both consistent with the Trade Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

14.2.2 In case of conflicts between the drawings and specifications, the specifications shall govern. In any case of omissions or errors in figures, drawings or specifications, the Trade Contractor shall immediately submit the matter to the Owner for clarification. The Owner's clarifications are final and binding on all Parties, subject to an equitable adjustment in Trade Contract Time or Price pursuant to ARTICLE 6 and ARTICLE 7 or dispute resolution in accordance with ARTICLE 12.

14.2.3 Where figures are given, they shall be preferred to scaled dimensions.

14.2.4 Any terms that have well-known technical or trade meanings, unless otherwise specifically defined in this Agreement, shall be interpreted in accordance with their well-known meanings. This Agreement entered into as of the date entered in ARTICLE 1.

14.2.5 PRECEDENCE In case of any inconsistency, conflict or ambiguity among the Trade Contract Documents, the documents shall govern in the following order: (a) Trade Contract Change Orders and written amendments to this Agreement; (b) this Agreement; (c) subject to subsection 14.2.2 the drawings, specifications and addenda issued prior to the execution of this Agreement; (d) approved submittals; (e) information furnished by the Owner pursuant to subsection 4.1.3; (f) other documents listed in this Agreement. Among all the Trade Contract Documents, the term or provision that is most specific or includes the latest date shall control. Information identified in one Trade Contract Document and not identified in another shall not be considered to be a conflict or inconsistency.

This Agreement entered into as of the date entered in ARTICLE 1.

OWNER State of Iowa, Department of Administrative Services

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Trade Contractor: *Contractor Name*

By: _____

(Authorized Representative)

Name:

Title:

Date:

Owner: State of Iowa - DAS

By: _____

(Authorized Representative)

Name:

Title:

Date:

END OF DOCUMENT.

DRAFT

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SECTION 00 6000

PERFORMANCE AND PAYMENT BOND

PART 1 - GENERAL

1.01 PERFORMANCE AND PAYMENT BOND

A. Performance and payment bonds to be used on this project, ConsensusDocs 260 and 261 are attached for reference following this page. ConsensusDocs performance and payment bonds are not required (other standard forms are acceptable to the State of Iowa).

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

CONSENSUSDOCS 260

PERFORMANCE BOND

This document was developed through a collaborative effort of organizations representing a wide cross-section of the design and construction industry. The organizations endorsing this document believe it represents a fair allocation of risk and responsibilities for all project participants.

Endorsing organizations recognize that this document must be reviewed and adapted to meet specific needs and applicable laws. This document has important legal and insurance consequences. You are encouraged to consult legal, insurance and surety advisors before completing or modifying this document. The software includes a notes section indicating where information is to be inserted to complete this document. Further information and endorsing organizations' perspectives are available at www.consensusdocs.org/guidebook.

For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Owner, _____,(the "Owner") and the Constructor, _____,(the "Constructor") have entered into a Contract (the "Contract") dated _____ for _____(the "Project"). The Contract is incorporated by reference into this Performance Bond (the "Bond").

By virtue of this Bond, the Constructor as Principal and _____as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount of _____Dollars ($_____)(the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors,

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administrators, successors and assigns, jointly and severally, as provided herein.

1. GENERAL CONDITIONS It is the condition of this Bond that if the Constructor performs its Contract obligations (the "Work"), the Surety's obligations under this Bond are null and void. Otherwise the Surety's obligations shall remain in full force and effect. The Surety waives any requirement to be notified of alterations or extensions of time made by the Owner in the Contract. The Owner may not invoke the provisions of this Bond unless the Owner has performed its obligations pursuant to the Contract. Upon making demand on this Bond, the Owner shall make the Contract Balance (the total amount payable by the Owner to the Constructor pursuant to the Contract less amounts properly paid by the Owner to the Constructor) available to the Surety for completion of the Work.

2. SURETY OBLIGATIONS If the Constructor is in default pursuant to the Contract and the Owner has declared the Constructor in default, the Surety promptly may remedy the default or shall

a. Complete the Work, with the consent of the Owner, through the Constructor or otherwise,

b. Arrange for the completion of the Work by a Constructor acceptable to the Owner and secured by performance and payment bonds equivalent to those for the Contract issued by a qualified surety. The Surety shall make available as the Work progresses sufficient funds to pay the cost of completion of the Work less the Contract Balance up to the Bond Sum, or

c. Waive its right to complete the Work and reimburse the Owner the amount of its reasonable costs, not to exceed the Bond Sum, to complete the Work less the Contract Balance.

3. DISPUTE RESOLUTION All disputes pursuant to this Bond shall be instituted in any court of competent jurisdiction in the location in which the Project is located and shall be commenced within two years after default of the Constructor or Substantial Completion of the Work, whichever occurs first. If this provision is prohibited by law, the minimum period of limitation available to sureties in the jurisdiction shall be applicable.

This Bond is entered into as of _____.

SURETY _____(seal)

By: .....

Print Name: _____

Print Title: _____

(Attach Power of Attorney)

Witness: .....

CONSTRUCTOR _____(seal)

By: .....

Print Name: _____

Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

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CONSENSUSDOCS 261

PAYMENT BOND

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For Use with ConsensusDOCS 200, Standard Form of Agreement and General Conditions Between Owner and Constructor (Where the Contract Price is a Lump Sum) and ConsensusDOCS 500, Standard Agreement and General Conditions Between Owner and Construction Manager.

The Owner, _____,(the "Owner ") and the Constructor, _____, (the "Constructor") have entered into a Contract (the "Contract") dated _____ for _____(the "Project"). The Contract is incorporated by reference into this Payment Bond (the "Bond").

By virtue of this Bond, the Constructor as Principal and _____as Surety ("Surety"), are bound to the Owner as Obligee in the maximum amount of _____Dollars ($_____)(the "Bond Sum"). The Constructor and Surety hereby bind themselves, their heirs, executors,

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administrators, successors and assigns, jointly and severally, as provided herein.

1. GENERAL CONDITIONS It is the condition of this Bond that if the Constructor promptly makes payment of all sums for all labor, materials, and equipment furnished for use in the performance of the work required by the Contract, the Surety's obligations pursuant to this Bond are null and void. Otherwise the Surety's obligations shall remain in full force and effect. The Surety waives any requirement to be notified of alterations or extensions of time made by the Owner in the Contract.

2. SURETY OBLIGATION Every Claimant who has not been paid in full before the expiration of a period of ninety (90) Days after such Claimant provided or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, may have a right of action on this Bond. The Surety's obligation to the Claimant(s) shall not exceed the Bond Sum.

3. LIMITATION OF ACTION No suit or action shall be commenced on this Bond by any Claimant

a. Unless Claimant, other than one having a direct Contract with the Constructor, shall have given written notice to the Constructor, the Owner and the Surety within ninety (90) Days after the Claimant provided or performed the last of the work or labor, or furnished the last of the materials for which the claim is made, stating with substantial accuracy the amount claimed and the name of the Party to whom the materials were furnished, or for whom the work or labor was provided or performed. Such notice shall be served by any means which provides written third party verification of delivery to the Constructor at any place it maintains an office or conducts business, or served in any manner in which legal process may be served in the state in which the Project is located.

b. After the expiration of one (1) year from the date on which the Claimant last performed labor or furnished materials or equipment on the Project. If this provision is prohibited by law, the minimum period of limitation available to sureties in the jurisdiction shall be applicable.

c. Other than in any court of competent jurisdiction in the location in which the Project is located.

4. CLAIMANT A Claimant is defined as an individual or entity having a direct contract with the Constructor or having a contract with a subcontractor having a direct contract with the Constructor to furnish labor, materials or equipment for use in the performance of the Contract.

This Bond is entered into as of _____.

SURETY _____(seal)

By: .....

Print Name: _____

Print Title: _____

(Attach Power of Attorney)

Witness: .....

CONSTRUCTOR _____(seal)

By: .....

Print Name: _____

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Print Title: _____

Witness: .....

(Additional signatures, if any, appear on attached page)

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SECTION 01 1200

CONTRACT SUMMARY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Project Information
B. Project Summary
C. Bid Scope Summary
D. Work Hour Restrictions
E. Access to Site
F. Coordination with Occupants
G. Rules for Construction Workers
H. Bid Package Instructions

1.02 PROJECT INFORMATION

A. Facility Name/Location: Department of Corrections Central Office Building, 818 S. 10th St., Council Bluffs, Iowa Zip 51501
B. DAS Project #: 9488.00
C. Owner: State of Iowa, Department of Administrative Services, Hoover State Office Building, Level 3, 1305 East Walnut Street, Des Moines, IA 50319
D. Owner's Representative: Jennie Elliott, Iowa Department of Administrative Services, 109 SE 13th Street, Des Moines, IA 50319
E. Construction Manager: Jerry Dehnke, Samuels Group, 2929 Westown Parkway, Suite 200, West Des Moines, 50266

1.03 PROJECT SUMMARY

A. The project includes the construction of a new two-story office building at 818 S. 10th St., Council Bluffs, Iowa 51501. The building is approximately 14,136 SF including forty offices, breakrooms, restrooms, conference rooms, mechanical space, and lobby area
B. Target date to provide substantial completion is June 18, 2027.

1.04 BID SCOPE SUMMARY

A. Scope Applicable to All Bid Packages:
   1. The Contractor's Work includes all labor, supervision, materials, equipment, services, supplies, tools, facilities, transportation, hoisting, storage, receiving, licenses, inspections, certifications, overhead, profit, or other items required or reasonably inferable to properly and timely perform and complete all work and services to be performed by the Contractor pursuant to this Agreement. Unless specifically stated otherwise, incidental work required to accomplish the work of this Bid Package shall be included the bid. This would include, but not be limited to, temporary facilities, protection of the work, security of equipment, materials, and work in progress, etc. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and Specification sections applicable to each Contractor's scope.
   2. Contractor is responsible for all labor and equipment to unload, account for all material delivered, stock, and delivery for this scope of work. Storage and delivery of materials and equipment at the Site shall be permitted only to the extent approved in advance by the Construction Manager, and if anything so stored obstructs the progress of any portion of the work, it shall be promptly removed or relocated by the Contractor without reimbursement.

3. On site supervision by Prime Contractor at all times work by that contractor or their subcontractors/suppliers is taking place.
4. Provide all temporary facilities required for this scope of work including trailer, trailer power, telephone, secured storage, temporary power for work, temporary and task lighting for work, etc. as determined necessary by Contractor. Coordinate location of trailers, material storage and utility lines with Construction Manager. Limited space is available, and permission to bring any such facility or excess materials on to the site shall be approved by the Construction Manager.
5. Contractor shall provide all equipment and tools for Contractor's own cleanup. Clean up shall be done at end of every shift or more frequently if required for the Contractor to perform their work, for other Contractors to perform their work, as required by the Owner's operations, and at the discretion of the Construction Manager.
6. All turf, landscaping, and subgrade disturbances caused by equipment traffic or other activities related to the Contractor's scope shall be repaired or restored to proper conditions by the Contractor.
7. Protect adjacent existing building elements from damage from Scope of work. Repair existing building elements damaged during Contractor's Scope of work.
8. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.
9. Prime Contractors shall provide training and instructions to all staff and sub tier contractors related to OSHA standards for work conducted on this project.
10. Contractors shall be responsible for dismantling and re-setting six-foot temporary fence for construction activities related to their scope of work.
11. Contractors shall provide all PPE for the project and their personnel.

1.05 WORK HOUR RESTRICTIONS

A. Work hours are from 7:00 AM to 4:00 PM, Monday through Friday unless arrangements are made in advance.
B. Work shall be allowed on Saturdays with 48 hours' notice to the construction manager.
C. No work is allowed on Sundays without seven days prior written approval from the State of Iowa Department of Corrections.
D. There is no work allowed on the following State Holidays: New Year's Day, Martin Luther King Day, Memorial Day, 4th of July, Labor Day, Veterans Day, Thanksgiving and day after Thanksgiving, and Christmas Day without seven days prior written approval from the State of Iowa Department of Corrections.
E. All working hours shall adhere to the City of Council Bluffs codes and ordinances.

1.06 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas noted on Drawings.
B. Provide access to and from site as required by law and Owner:
   1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
   2. Do not obstruct roadways, sidewalks, or other public ways without permission of Owner and permit if required.
C. Facility will be occupied at all times during duration of work. Contractor personnel shall conduct themselves in an agreeable manner at all times. Failure to do so may result in removal from the work site.
D. Contractors are responsible for securing and protecting all equipment, tools, and stored materials.
E. Coordinate schedule of work with facility and construction manager.

1.07 OWNER OCCUPANCY

A. Owner intends to occupy the Project upon Substantial Completion.
B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
C. Schedule the Work to accommodate Owner occupancy.

1.08 RULES FOR CONSTRUCTION WORKERS

A. The staff of the State of Iowa has a responsibility to protect the public by providing a secure environment. All work site rules must be followed to the letter, at all times.
B. All construction workers must have a background check completed prior to entering the campus to perform work.
C. Hot Work Permit Processes and Fire Watch, when necessary, will be adhered to for this project.
D. All State property is tobacco free. No smoking will be permitted or tolerated on State property.
E. No vaping or tobacco products.
F. You are permitted access only to the work site and no other area of the Department of Corrections Property or buildings.
G. **Access to the interior of any buildings at the Iowa Department of Corrections is strictly prohibited without authorization and escorting from DOC facility staff.**
H. No drugs, alcohol, or firearms are allowed on the work site or State property.
I. Do not leave money, drugs, alcohol, or firearms in your personal vehicle.
J. Company and personal vehicles are to be parked and locked in designated or authorized area of the work.
K. Personal vehicles should utilize street parking.
L. Contractors are to utilize street parking. Minimal parking will be available in the construction area for company vehicles.
M. Secure all tools at the end of the day.
N. Maintain control of all tools, supplies, and debris at all times during the work.
O. Never leave keys in any vehicle. If a security officer finds keys in a vehicle, they are under orders to turn them in to a security supervisor.
P. Do not give anything to residents or take anything from residents; if they offer, inform your supervisor.
Q. Secure all tools at the end of each day. Never leave tools unattended. All tools shall be checked in at the beginning of the day and checked out at the end of the day. If security officers find loose tools, they are under orders to turn them in to their supervisor.
R. All delivery vehicles must go directly to the job site. Extra time should be anticipated for all deliveries. Provide 24-hour notice to the facility of deliveries.
S. During an emergency, follow the instructions of the security staff.
T. Contractor shall wear clothing of a different color, pattern, fashion, etc. as to distinguish themselves from residents.
U. **Contractors will always wear hard hats and safety glasses on this project.**
V. Contractors shall provide all PPE for the project and their personnel.
W. No vaping or tobacco products are allowed on State of Iowa property.
X. All State property is tobacco free. No smoking will be permitted or tolerated on State of Iowa property.

1.09 BID PACKAGE INSTRUCTIONS

A. **Bid Package #01** – General Construction: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
   1. General Construction.
   2. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and applicable technical specification sections for the scope of work.
   3. Includes all labor, material, and equipment to perform the work of this bid package.

4. Civil – All civil and site work for drawings C2, C3, C4, C5, C6, C7, C8, C9, C10, and C11. Estimated quantities listed on drawing C2. All improvements shall conform to the Iowa statewide Urban Design & Specifications (SUDAS).
5. Division 03 (In its entirety)
6. Division 04 (In its entirety)
7. Division 05 (In its entirety)
8. Division 06 (In its entirety)
9. Division 07 (Sections 07 1326, 07 2100, 07 2700, 07 4643, 07 8413, and 07 8446) (In their entirety)
10. Division 07 (07 9200 as applies to work of this bid package)
11. Division 08 (In its entirety)
12. Division 09 (In its entirety)
13. Division 10 (In its entirety)
14. Division 12 (In its entirety)
15. Division 31 (In its entirety)
16. Interior building concrete equipment pads – coordinate size and location with MEP.
17. Back of parapet wall sheathing and parapet blocking/sheathing.
18. Temporary stairs to second floor of building during construction.
19. Temporary enclosures for window and door openings during construction.
20. OSHA compliant temporary handrails for second floor of building during construction.
21. All surveys and layout related to this bid package.
22. Coordinate and schedule with MEP trades for openings, electrical and HVAC penetrations/sleeves/rough-ins.
23. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.

B. **Bid Package #02** – Roofing: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Roofing (TPO System), Sheet Metal, Gutter/Downspouts, and roof accessories.
2. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and applicable technical specification sections for the scope of work.
3. All labor, material, and equipment to perform the work of this bid package.
4. Division 07 (Section 07 4112, 07 5400, 07 6200, 07 6310, and 07 7200) (In their entirety)
5. Division 07 (07 9200 as applies to work of this bid package)
6. All surveys and layout related to this bid package
7. Coordinate and schedule with MEP trades for openings, electrical and HVAC penetrations/sleeves/rough-ins.
8. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.

C. **Bid Package #03** – Conveying Systems (Hydraulic Elevator): Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Conveying Systems (Hydraulic Elevator)
2. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and applicable technical specification sections for the scope of work.
3. All labor, material, and equipment to perform the work of this bid package.
4. Division 14 (In its entirety)
5. Division 07 (07 9200 as applies to work of this bid package)
6. All surveys and layout related to this bid package.
7. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.

D. **Bid Package #04** – Fire Suppression: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Fire Suppression

2. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and applicable technical specification sections for the scope of work.
3. All labor, material, and equipment to perform the work of this bid package.
4. Division 21 (In its entirety)
5. Division 07 (07 9200 as applies to work of this bid package)
6. All surveys and layout related to this bid package.
7. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.

E. **Bid Package #05** - Plumbing-HVAC: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. HVAC-Plumbing
2. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and applicable technical specification sections for the scope of work.
3. All labor, material, and equipment to perform the work of this bid package.
4. Division 22 (In its entirety)
5. Division 23 (In its entirety)
6. Division 07 (07 9200 as applies to work of this bid package)
7. All surveys and layout related to this bid package
8. Connect owner supplied appliances to plumbing systems.
9. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.

F. **Bid Package #06** – Electrical-Communications-Elect. Safety/Security: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Electrical-Communications-Elect. Safety/Security.
2. Contractor's Work shall be performed in accordance with the Drawings, Specification Divisions 00 and 01, and applicable technical specification sections for the scope of work.
3. All labor, material, and equipment to perform the work of this bid package.
4. Division 26 (In its entirety)
5. Division 27 (In its entirety)
6. Division 28 (In its entirety)
7. Division 07 (07 9200 as applies to work of this bid package)
8. All surveys and layout related to this bid package
9. Temporary lighting.
10. Temporary power.
11. Connect owner supplied appliances to electrical systems.
12. Include lump sum Allowance of $5,000.00 for Mid-American temporary electrical service costs and coordination costs. Contractor to submit invoices, delivery slips, and/or time sheets to show actual quantities to be signed off by construction manager at time of execution/delivery.
13. Coordinate and schedule work with all contractors, construction manager, trades, and bid packages.

G. **Alternate #01** – LP-1 at all LP-2 locations: Trade Contractor shall include all of the following, but not limited to, as part of the contract:
1. Provide Fiber Cement Lap Siding (LP-01) at all Fiber Cement Panel Board (LP-02) locations.
2. Includes extruded aluminum transitions between the base bid lap siding and alternate lap siding for color transition.
3. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
4. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

5. Execute accepted alternates under the same conditions as other work of the Contract.

H. **Unit Price #01** – Additional Over-Excavation (One Cubic Yard): Trade Contractor shall include all of the following, but not limited to, as part of the contract:
   1. Provide unit cost (One Cubic Yard) for additional over-excavation beyond base bid scope.
   2. Base Bid: Over-excavation and fill from bottom of footing to elevation (96-0”) – Footings that are indicated to bear at elevation (96-0”) are not intended to have over-excavation and fill below the footings. Reference drawing S101 for additional foundation notes.
   3. Unit prices include all necessary material, plus cost for delivery, installation, insurance, overhead, and profit.
   4. Owner reserves the right to reject Contractor’s measurements of work in place that involves use of established unit prices and to have this work measured, at the Owner’s expense, by an independent surveyor acceptable to the Contractor.

I. **Work Performed by Owner:** Department of Corrections will perform the following work items:
   1. Relocate all moveable furniture, fixtures and equipment (FF&E), including window treatments; and personal materials from each sequenced work area prior to demolition and construction activities and after new construction is completed.
   2. Special Inspections and Testing.

J. **Owner Furnished Products:** Department of Corrections will provide the following materials for installation by the contractor:
   1. Upright Refrigerators (Qty. 3) and Dishwasher (Qty. 1)

K. **Owner Furnished Products:** State of Iowa will provide the following materials
   1. Temporary Construction Fencing and access gates around the perimeter of the project.
   2. Temporary Sanitary Toilets (Port-A-Johns).
   3. Dumpster/Roll Off Service.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 2500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Substitution Procedures
B. Request for Substitution form

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 SUBSTITUTION PROCEDURES

A. Where the Bidding Documents stipulate a specific product be provided by naming one or more manufacturer and model, a substitute product will be considered when written request is received by the date and time identified in Section 00 1113 NOTICE TO BIDDERS. Substitution requests will be considered for all products, even if the specification does not include a statement such as “or equal,” “equal to,” “equivalent to,” or “basis of design,” unless noted otherwise.
B. References in the Bidding Documents to brand or trade names are intended to illustrate the general characteristics of the item and not to limit competition unless noted otherwise.
C. The written request shall be on the “Request for Substitution” form included in the Project Manual. If no such form is included, the request shall be provided on the letterhead of the company making the request.
D. Substitution requests received after the specified date will be viewed in the context of a Change Order to the Contract, and consideration will only be given in the event a product becomes unavailable or not practical due to no fault of the Contractor, or the substitution is substantially to the Owner’s advantage (equal product for less cost or higher quality product at no change in Contract Sum).
E. Document each substitution request with complete data substantiating compliance of the proposed substitution with the Bidding Documents. Each request shall identify the specified product for which the substitution is requested, and shall clearly describe the product for which approval is requested. The burden shall be on the requester to demonstrate the proposed substitute product’s suitability for use in the Work and its equivalency or superiority in function, appearance, quality, and performance with the product named in the Bidding Documents.
F. A description of any changes to the Bidding Documents that the proposed substitution will require shall be included with the request. The requester shall affirm that dimensions shown on the Drawings will not be affected by the substitute product, and that it will have no adverse effect on other trades, the construction schedule, or specified warranty requirements. The request for use of a substitute product shall be signed by an authorized representative of the firm submitting the request, who shall state that the firm will pay for any changes to the building design, including Design Professional’s design, detailing, and construction cost caused by the requested substitution if the substitution is approved for use in the Work.
G. All such substitute products approved for use in the Work during the established period of time before receipt of Bids will be identified in a subsequent Addendum to the Bidding Documents.

3.02 REQUEST FOR SUBSTITUTION FORM

A. A Request for Substitution Form is attached following this page.
B. Substitution requests shall be emailed to the Issuing Officer at the email address provided in Instructions to Bidders Section 1.04.

END OF SECTION

SUBSTITUTION REQUEST
(During the Bidding/Negotiating Phase)

PROJECT: _____

SUBSTITUTION REQUEST NUMBER: _____

FROM: _____

TO: _____

DATE: _____

A/E PROJECT NUMBER: _____

RE: _____

CONTRACT FOR: _____

SPECIFICATION TITLE: _____

DESCRIPTION: _____

SECTION: _____ **PAGE:** _____

ARTICLE/PARAGRAPH: _____

PROPOSED SUBSTITUTUION: _____

MANUFACTURER: _____ **ADDRESS:** _____ **PHONE:** _____

TRADE NAME: _____ **MODEL NO.:** _____

Attached data includes product description, specifications, drawings, photographs, and 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:
- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.

SUBMITTED BY: _____

SIGNED BY: _____

FIRM: _____

ADDRESS: _____

TELEPHONE: _____

A/E's REVIEW AND RECOMMENDATION:

- ☐ Approve Substitution—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Approve Substitution as noted—Make submittals in accordance with Specification Section 01 33 00 Submittal Procedures.
- ☐ Reject Substitution—Use specified materials.
- ☐ Substitution Request received too late—Use specified materials.

SIGNED BY: **DATE:**

SUPPORTING DATA ATTACHED: ☐ **Drawings** ☐ **Product Data** ☐ **Samples** ☐ **Tests** ☐ **Reports** ☐ _____

CSI Form 1.5C (August 2020 version)

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SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Change procedures

1.02 CHANGE PROCEDURES

A. The Design Professional will advise of minor changes in the work not involving an adjustment to Contract Sum/Price or contract time as authorized.
B. The Construction Manager may issue a Proposal Request that includes a detailed description of a proposed change with supplementary or revised drawings and specifications and a change in contract time for executing the change as provided by the Design Professional. The Trade Contractor will prepare and submit an estimate within 7 calendar days. Estimates shall be provided for the project at no cost, regardless of acceptance or rejection of proposal.
C. The Trade Contractor may propose changes by submitting a Request for Information to the Construction Manager, describing the proposed change and its full effect on the work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and contract time with full documentation and a statement describing the effect on work by separate or other contractors. Document any requested substitutions in accordance with the specifications. Construction Manager will forward the Request for Information on to the Design Professional for their official response.
D. Stipulated Sum/Price Change Order: Based on executed Change Order and contractor's fixed price quotation.
E. Unit Price Change Order: The change order will be executed on a fixed unit price basis for pre-determined unit prices and quantities. Changes in contract price or contract time will be computed as specified for time and material change orders.
F. Time and Material Change Order: The change order will be executed on a not to exceed basis. Design professional and Construction Manager will determine the not to exceed estimated cost based on contractor’s proposal for hourly rates and material costs. Maintain detailed records of work done on time and material basis. Time and Material tickets must be submitted daily to the Construction Manager for verification. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the work. Submit itemized account and supporting data after completion of change. A final deductive change order will be issued to reconcile final cost to the initial change order.
G. Change Order Forms: CONSENSUSDOC Forms provided by Owner.
H. Execution of Change Orders: The Construction Manager will issue change orders for signature of parties as provided in the Conditions of the Contract.
I. With respect to pricing change orders, the percentage mark-up for overhead and profit is subject to the following limits:
    1. Fifteen (15) percent maximum for work directly performed by employees of the Constructor, Subcontractor or Sub-subcontractor.
    2. Five (5) percent maximum for work performed or passed through by a Subcontractor and passed through to the Owner by the Constructor.
    3. Five (5) percent maximum Subcontractor’s mark-up for Work performed by a Sub-Subcontractor and passed through to the Owner by the Subcontractor and Constructor.
    4. The maximum allowable mark-up shall be twenty-five (25) percent passed through to the Owner by the Constructor under any circumstances. Overhead and profit shall be shown separately for the Constructor and each Subcontractor of any tier performing the Change Order Work.

J. Contractor and subcontractor agree to provide and require all suppliers to provide a detailed breakdown of labor, labor burden, materials, installation, rental, and fuel costs.

K. **Please refer to Article 8 of CONSENSUSDOCS 802- STANDARD FORM OR AGREEMENT BETWEEN OWNER AND TRADE CONTRACTOR for additional Change Procedures.**

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Schedule of values
B. Application for payment

1.02 SCHEDULE OF VALUES

A. Coordination: Trade Contactor will coordinate preparation of the Schedule of Values with preparation of the Construction Manager's Construction Schedule.
   1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, Submittals Schedule, and Construction Manager's Construction Schedule.
   2. Submit original Schedule of Values in Procore within 14 days after date of Owner-Trade Contractor Agreement. Schedule of Values must be approved by Owner prior to submission for first application for payment.
B. Format: Utilize the Table of Contents of this project manual. Identify each line item with number and title of the major specification section. Each major specification section should be further itemized by materials cost, labor cost and subcontractor cost for each building separately for the base bid and all accepted alternates. Identify site mobilization, bonds and insurance and include a line item for closeout paperwork for a value of no less than 1% of the total contract value or $1,000, whichever is greater.
   1. Identification: Include the following Project identification on the Schedule of Values:
      a. Project name and location.
      b. Name and address of Owner, Trade Contractor, Construction Manager and Design Team.
      c. DAS Project Number.
      d. Date of Submittal.
   2. Revise the Schedule of Values to list approved Change Orders with each Application for Payment.

1.03 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications for payments as certified by the Design Professional and paid for by Owner.
   1. 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. Progress payments shall be submitted to the Construction Manager. Any request for payment for work completed prior to June 30th of any year needs to be submitted by July 15th of the same calendar year.
C. Payment Application Forms: Use AIA form G702 and G703 as the form for the Application for Payment or an equivalent approved by the owner.
D. Include lien waiver forms required by the owner when applicable.
E. Application Preparation: Complete every entry on form. Construction Manager will return incomplete applications without action.
   1. Include amounts of Change Orders issued before last day of construction period covered by application.

F. Waivers of Mechanic's Lien: If requested by Owner with each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment when applicable.
   1. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   2. Submit waivers of lien on forms, executed in a manner acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede submittal of first Application for Payment include the following:
   1. Schedule of Values
   2. Certificates of insurance and insurance policies.
   3. Lists of vendors and any subcontractors.

H. Application for Payment at Substantial Completion: After the Certificate of Substantial Completion has been fully executed, submit an Application for Payment showing 100 percent completion for the portion of the Work claimed as substantially complete, not including the closeout paperwork line item.
   1. Include documentation supporting the claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: 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.”
   5. AIA Document G706A, “Contractor's Affidavit of Release of Liens.”
   6. AIA Document G707, “Consent of Surety to Final Payment.”
   7. Letter of Notification to all sub-contractors and suppliers of application for release of retainage.
   8. Evidence that claims have been settled.
   9. Provide Final Lien Waivers.

J. Payments will be made to the extent of the value of the work performed in the previous month less a retainage amount of 3% of the value of the work performed. Upon substantial completion for the entire work, a sum sufficient to decrease the total retained to 3% of the contract sum, plus the full amount of the line item for closeout paperwork, plus such other retainage as the engineer shall determine for all incomplete work and unsettled claims will be authorized. The closeout paperwork line item may only be billed once the certificate of final completion has been fully executed.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION – NOT USED

END OF SECTION

SECTION 01 3100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Coordination
B. Pre-construction meeting
C. Progress meetings
D. Coordination Meetings
E. Requests for Interpretation (RFIs)
F. Background Checks

1.02 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the project manual to ensure efficient and orderly sequence of installation of interdependent construction elements.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Administrative procedures: The Trade Contractor will coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Trade Contractor's Construction Schedule.
   2. Provide updated information for Construction Manager's Construction Schedule.
   3. Preparation of Schedule of Values.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Pre-installation conferences.
   7. Project closeout activities

C. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work, which are indicated diagrammatically on drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated conceal pipes and wiring within the construction. Coordinate locations of piping with finish elements.

F. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion.

G. After owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of owner's activities.

H. During construction coordinate use of site and facilities through Construction Manager.

I. Comply with Construction Manager and Owner’s procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

J. Make the following types of submittal to Architect through the Construction Manager via Procore:
   1. Request for Information/Interpretation.
   2. Request for substitution.
   3. Shop drawings, product data, and samples.
   4. Test and inspection reports.
   5. Design data.
   6. Manufacturer's instructions and field reports.
   7. Applications for payment and change order requests.
   8. Progress schedules.
   9. Coordination drawings.
   10. Correction punch list and final correction punch list for substantial completion
   11. Closeout submittals

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION MEETING

A. The Construction Manager and Owner will schedule a meeting after Notice of Award.
B. Required: Design Professional, Owner, Construction Manager, Trade Contractor and any Sub Contractors.
C. Agenda:
   1. Execution of Owner-Contractor Agreement.
   2. Submission of executed bonds and insurance certificates.
   3. Distribution of Contract Documents.
   4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
   5. Designation of personnel representing the parties in Contract.
   6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, change orders, RFIs and contract closeout procedures
   7. Tentative construction schedule.
   8. Critical work sequencing and long-lead items.
   9. Procedures for testing and inspecting.
   10. Preparation of Record Documents.
   11. Safety Procedures.
   12. Owner's requirements.
   13. Security and housekeeping procedures.
   14. Background Checks.
   15. Responsibility for temporary facilities and controls.
   16. Construction waste management.
   17. Logistics (use of premise, parking, work restrictions, maintain egress, etc.)
D. The Construction Manager is to record minutes and distribute copies within two days after meeting to participants, with one copy to owner, participants, and those affected by decisions made.

3.02 PROGRESS MEETINGS

A. The Construction Manager shall schedule and administer meetings throughout progress of the work at bi-weekly (one every other week) intervals.
B. The Construction Manager is to make arrangements for meetings, prepare agenda with copies for participants, and preside at meetings, record minutes and distribute copies within two days to those affected by decisions made.

C. Attendees may include: Project superintendent, major subcontractors and suppliers, Owner, Construction Manager, Architect/Engineer, as appropriate to agenda topics for each meeting. All participants at the conference call shall be familiar with the Project and authorized to conclude matters relating to the Work.

D. Agenda:
   1. Review minutes of previous meetings.
   2. Review the Construction Manager's Construction Schedule.
   3. Field observations, problems, and decisions.
   4. Identification of problems that impede planned progress.
   5. Review of submittals schedule and status of submittals.
   6. Review of RFI's.
   7. Review of off-site fabrication and delivery schedules.
   8. Corrective measures to regain projected schedules.
   9. Planned progress during succeeding work period.
   10. Coordination of projected progress.
   11. Maintenance of quality and work standards.
   12. Effect of proposed changes on progress schedule and coordination.
   13. Other business relating to work.
   14. Access, temporary facilities and controls, housekeeping and progress cleaning.
   15. Safety.
   16. Status of proposal requests, pending changes, official Change Orders.

E. Minutes:
   1. Following the meeting, the meeting minutes will be published in Procore by the Construction Manager for all parties.

3.03 COORDINATION MEETINGS

A. Coordination meetings will be held at the discretion of the construction manager.

3.04 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, prepare and submit an RFI in Procore.
   1. RFIs shall originate with Trade Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in the Work.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
   1. Specification Section number and title and related paragraphs, as appropriate.
   2. Drawing number and detail references, as appropriate.
   3. Field dimensions and conditions, as appropriate.
   4. Trade Contractor's suggested solution(s). If Trade Contractor's solution(s) impact the Contract Time or the Contract Sum, Trade Contractor shall state impact in the RFI.
   5. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Design Professional's Action: Design Professional will review each RFI, determine action required, and return it. Allow seven (7) working days for Design Professional's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day. The following RFIs will be returned without action:
   1. Requests for approval of submittals.
   2. Requests for approval of substitutions.
   3. Requests for coordination information already indicated in the Contract Documents.
   4. Requests for adjustments in the Contract Time or the Contract Sum.

5. Requests for interpretation of Design Professional's actions on submittals.
6. Incomplete RFIs or RFIs with numerous errors.
7. Design Professional's action may include a request for additional information, in which case Design Professional's time for response will start again.

D. Design Professional's action on RFIs that may result in a change to the Contract Time or the Contract Sum/Price.
   1. If Trade Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Construction Manager in writing within ten (10) days of receipt of the RFI response.

E. On receipt of Design Professional's response in Procore, review the response and notify Design Professional within seven (7) days if Trade Contractor disagrees with response.

3.05 BACKGROUND CHECKS

A. Background checks must be performed on all on site employees, including sub-contractors.

B. The Contractor hereby explicitly authorized the Iowa DAS to conduct criminal history and/or other background investigation(s) of the Contractor, its officers, supervisory personnel, employees, and other staff retained by the Contractor or their sub-contractors for the performance of the contract.

C. A state of Iowa record check request form will be provided at the pre-construction meeting. Information required may include:
   1. Last Name
   2. First Name
   3. Middle Name
   4. Date of Birth
   5. State Driver’s License or State ID #
   6. Social Security #

END OF SECTION

SECTION 01 3100.01

WEB BASED CONSTRUCTION MANAGEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Owner and Contractor shall utilize **Procore Technologies, Inc. Procore** system for electronic submittal of all data and documents (unless specified otherwise by the owner's representative) throughout the duration of the Contract. **Procore** is a web-based electronic media site that is hosted by **Procore Technologies, Inc.**, utilizing their **Procore** web solution. **Procore** will be made available to all contractors' project personnel, subcontractor personnel, suppliers, consultants and the Designer of Record. The joint use of this system is to facilitate; electronic exchange of information, automation of key processes, and overall management of the contract. **Procore** shall be the primary means of project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents, the paper documents will govern. **Procore** is a registered trademark of **Procore Technologies, Inc.**

1.02 USER ACCESS LIMITATIONS

A. The Owner's Representative/Construction Manager will control the Contractor's access to **Procore** by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system, determine assigned function-based authorizations (determines what can be seen) and user privileges (determines what they can do). Sub-contractors and suppliers will be given access to **Procore** through the Contractor. Entry of information exchanged and transferred between the Contractor and its sub-contractors and suppliers on **Procore** shall be the responsibility of the Contractor.
   1. Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the **Procore** system) by the Owner's Representative and the Contractor will be jointly owned.

1.03 AUTOMATED SYSTEM NOTIFICATION AND AUDIT LOG TRACKING

A. Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

1.04 SUBMITTALS

A. See Section 01 3300 SUBMITTAL PROCEDURES:
B. Preconstruction Submittals
   1. List of Contractor's key **Procore** personnel. Include descriptions of key personnel's roles and responsibilities for this project. Contractor should also identify their organization's administrator on the list.

1.05 COMPUTER REQUIREMENTS

A. The Contractor shall use computer hardware and software that meets the requirements of the **Procore** system as recommended by **Procore Technologies, Inc.** to access and utilize

Procore. As recommendations are modified by **Procore**, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract. The contractor will ensure that connectivity to the **Procore** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirement for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. **Procore** supports the current and prior two major versions of Chrome, Firefox, Internet Explorer, and Safari.

B. The Contractor shall be responsible for the validity of their information placed in **Procore** and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, cad drawing applications, and Adobe Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in **Procore** to the maximum extent possible. If a form does not exist in **Procore** the Contractor must include a form of their own or provided by the Owner representative as an attachment to a submittal. Adobe PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of **Procore** (outside what is provided by the owner) and the other programs indicated above as needed.

C. User Access Administration: Provide a list of Contractor's key **Procore** personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owners Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and sub-contractors to **Procore.**

1.06 CONNECTIVITY PROBLEMS

A. **Procore** is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. **Procore** response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc. and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of **Procore** including, but not limited to: slow response time, down time periods, connectivity problems, or loss of information. The contractor will ensure that connectivity to the **Procore** system (whether at the home office or job site) is accomplished through DSL, cable, T-1 or wireless communications systems. The minimum bandwidth requirement for using the system is 128kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage of the **Procore** be grounds for a time extension or cost adjustment to the contract.

1.07 TRAINING

A. The Construction Manager shall provide the necessary training to the Prime Contractor.

PART 2 - PRODUCTS

2.01 DESCRIPTION

A. **Procore** project management application (no equal) Provided by Procore Technologies, Inc. www.**Procore**.com

PART 3 - EXECUTION

3.01 PROCORE UTILIZATION

A. **Procore** shall be utilized in connection with submittal preparation and information management required by Sections:
   1. PROJECT MANAGEMENT AND COORDINATION
   2. CONSTRUCTION PROGRESS DOCUMENTATION
   3. SUBMITTAL PROCEDURES
   4. QUALITY REQUIREMENTS
   5. Other Division One sections.
   6. Requirements of this section are in addition to requirements of all other sections of the specifications.

B. Design Document Submittals
   1. All design drawings and specifications shall be submitted as cad .dwg files or PDF attachments to the **Procore** submittal work flow process and form.

C. Shop Drawings
   1. Shop drawing and design data documents shall be submitted as cad .dwg files or PDF attachments to the **Procore** submittal work flow process and form. Examples of shop drawings include, but are not limited to:
   2. Standard manufacturer installation drawings.
   3. Drawings prepared to illustrate portions of the work designed or developed by the Contractor.
   4. Steel fabrication, piece, and erection drawings.

D. Product Data
   1. Product catalog data and manufacturer’s instructions shall be submitted as
   2. PDF attachments to the **Procore** submittal work flow process and form. Examples of product data include, but are not limited to:
   3. Manufacturer's printed literature.
   4. Preprinted product specification data and installation instructions.

E. Samples
   1. Sample submittals shall be physically submitted as specified in Section 01 3300 SUBMITTAL PROCEDURES. Contractor shall enter submittal data information into **Procore** with a copy of the submittal form(s) attached to the sample. Examples of samples include, but are not limited to:
   2. Product finishes and color selection samples.
   3. Product finishes and color verification samples.
   4. Finish/color boards.
   5. Physical samples of materials.

F. Administrative Submittals
   1. All correspondence and pre-construction submittals shall be submitted using **Procore**. Examples of administrative submittals include, but are not limited to:
   2. Digging permits and notices for excavation.
   3. List of product substitutions
   4. List of contact personnel.
   5. Notices for roadway interruption, work outside regular hours, and utility cut overs.
   6. Requests for Information (RFI).
   7. Construction progress Schedules and associated reports and updates.
      a. Each schedule submittal specified in CONSTRUCTION PROGRESS DOCUMENTATION shall be submitted as a native backed-up file (.PRX or .STX)

of the scheduling program being used. The schedule will also be posted as a PDF file in the format.

8. Plans for safety, demolition, environmental protection, and similar activities.
9. Quality Control Plan(s), Testing Plan and Log, Quality Control Reports, Production Reports, Quality Control Specialist Reports, Preparatory Phase Checklist, Initial Phase Checklist, Field Test reports, Summary reports, Rework Items List, etc.
10. Meeting minutes for quality control meetings, progress meetings, pre-installation meetings, etc.
11. Any general correspondence submitted.

G. Compliance Submittals
   1. Test reports, certificates, and manufacture field report submittals shall be submitted on **Procore** as PDF attachments. Examples of compliance submittals include, but are not limited to:
      a. Field test reports.
      b. Quality Control certifications.
      c. Manufacturer's documentation and certifications for quality of products and materials provided.

H. Record and Closeout Submittals
   1. Operation and maintenance data and closeout submittals shall be submitted on **Procore** as PDF documents during the approval and review stage as specified, with actual set of documents submitted for final. Examples of record submittals include, but are not limited to:
      a. Operation and Maintenance Manuals: Final documents shall be submitted as specified.
      b. As-built Drawings: Final documents shall be submitted as specified.
      c. Extra Materials, Spare Stock, etc.: Submittal forms shall indicate when actual materials are submitted.

I. Financial Submittals
   1. Schedule of Value, Pay Applications and Change Request Proposals shall be submitted on **Procore.** Supporting material for Pay Applications and Change Requests shall be submitted on **Procore** as PDF attachments. Examples of compliance submittals include, but are not limited to:
      a. Contractors Schedule of Values
      b. Contractors Monthly Progress Payment Requests
      c. Contract Change proposals requested by the project owner

END OF SECTION

SECTION 01 3200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Construction Progress Schedule
B. Construction Manager's Construction Schedule
C. Submittal Schedule
D. Daily Construction Reports
E. Progress Photographs

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION MANAGER'S MASTER CONSTRUCTION SCHEDULE

A. Upon award of package, Contractor agrees to accept and meet or improve upon the schedule proposed in section **00 3113 PRELIMINARY SCHEDULE** with intermediate handoffs. Each package contractor will be required to participate in schedule coordination meetings with the Construction Manager.
B. If the bid package contractor does not meet the handoff milestones in the master construction schedule, the bid package contractor shall take measures to increase work forces, increase work hours, initiate revisions to means and methods of construction, and/or other similar measures as required to make up lost time and complete the work in accordance with the construction schedule and remain consistent with project progress and overall construction schedule. Such measures shall be at no additional cost to the Owner. The Construction Manager shall have sole discretion on decisions to accelerate work.
C. Updating the master construction schedule – Contractors are required to attend and participate in schedule coordination update meetings with the Construction Manager. This will be an opportunity for contractors to further define their scheduled scope of work in conjunction with other trades on site.
D. Acceptance of revised master construction schedule – After an updated master construction schedule has been issued via Procore, Contractors will have 48 hours to dispute the new schedule. All contractors will be held to the last fully accepted master construction schedule.

3.02 CONSTRUCTION PROGRESS SCHEDULE

A. Submit preliminary outline to the Construction Manager no later than 48 hours prior to the pre-construction meeting for coordination with Owner's requirements.
B. Submit revised progress schedule with each application for payment.
C. Schedules will be electronically submitted through Procore.
D. Distribute copies of reviewed schedules to project site file, subcontractors, suppliers, and other concerned parties.
E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
F. Submit computer generated horizontal bar chart with separate line for each major portion of work or operation, identifying the first day of each week.
G. Show complete sequence of construction activity, identifying work of separate stages and other

logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.

H. Indicate estimated percentage of completion for each item of work at each submission.

I. Participate in joint review and evaluation of schedule with Construction Manager.

J. Revisions to schedules:
   1. Indicate progress of each activity to date of submittal and projected completion date of each activity.
   2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.
   3. Prepare narrative report to define problem areas, anticipate delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including effect of changes on schedules of separate contractors.

3.03 SUBMITTAL SCHEDULE

A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrications, and delivery when establishing dates.
   1. Coordinate submittal schedule with list of subcontractors, the schedule of values, and construction schedule.
   2. Submit concurrently with first complete submittal of contractor’s construction schedule.

3.04 DAILY CONSTRUCTION REPORTS

A. Daily Construction Reports: Submitted at weekly intervals.
   1. Daily Construction Reports will be submitted to Construction Manager.

B. Prepare a daily construction report recording the following information concerning events at project site:
   1. Count of personnel at Project site
   2. Equipment at Project site
   3. Material Deliveries
   4. High and low temperatures and general weather conditions, including presence of rain or snow
   5. Accidents
   6. Meetings and significant decisions
   7. Unusual events
   8. Stoppages, delays, shortages, and losses
   9. Meter readings and similar recordings
   10. Emergency procedures
   11. Orders and requests of authorities having jurisdiction
   12. Change orders received and implemented
   13. Services connected and disconnected
   14. Equipment or system tests and startups
   15. Partial completions and occupancies
   16. Substantial completions authorized

3.05 PROGRESS PHOTOGRAPHS

A. Progress photographs will be electronically submitted through Procore.

B. Preconstruction Photographs: Before starting construction, take photographs of project site and

surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction manager.

1. Take additional photographs as required to record existing damage to site, structure, equipment, or finishes.

C. Periodic Construction Photographs: Take photographs at regular intervals. Select vantage points to show status of construction and progress since last photographs were taken.

D. Field Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as project record documents. Construction manager will inform of desired vantage points.

END OF SECTION

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SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Submittals for Review
B. Submittals for Information
C. Submittal Procedures
D. Samples

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product Data
   2. Shop Drawings
   3. Samples for Selection
   4. Samples for Verification
B. Submit to Construction Manager to forward to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
C. Samples will be reviewed only for aesthetic, color, or finish selection.
D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record document purposes.

3.02 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer’s instructions.
   6. Manufacturer’s field reports.
   7. Other types indicated.
B. Submit for Construction Manager, Architect, and Owner’s knowledge. No action will be taken.

3.03 SUBMITTAL PROCEDURES

A. Submittals will be electronically submitted through Procore. Contractor will be invited to join web based program after issue of Notice of Intent to award.
B. Shop Drawing Procedures:
   1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
   2. Do not reproduce the Contract Documents to create shop drawings.

3. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

C. Transmit each submittal with a copy of approved submittal form.

D. Sequentially number the submittal form. Revise submittals with original number and a sequential numeric suffix.

E. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

F. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.

G. Schedule submittals to expedite the project and coordinate submission of related items.

H. For each submittal review, allow 15 days excluding delivery time to and from the contractor.

I. Identify variations from the Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

3.04 SAMPLES

A. Submit to Construction Manager to forward to Architect/Engineer for review for limited purpose for checking conformance with information given and design concept expressed in the Contract Documents.

B. Samples for selection as specified in product sections:

1. Submit to Construction Manager to forward to Architect/Engineer for aesthetic, color, or finish selections.
2. Submit samples of finishes from full range of manufacturer's standard colors, textures, and patterns to Construction Manager to forward to Architect/Engineer for selection.

C. Submit samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

D. Include identification on each sample, with full project information.

E. Submit number of samples specified in individual specification sections.

F. Photograph of submitted samples, along with transmittal sheet, shall be uploaded as a submittal in Procore.

END OF SECTION

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. References
B. Quality assurance and control of installation
C. Tolerances
D. Defect Assessment
E. Inspection and testing laboratory services
F. Manufacturer's field services and reports

1.02 REFERENCES

A. Conform to reference standard in effect at date of contract.
B. When required by contract documents, obtain copies of standards.
C. Should specified reference standards conflict with contract documents request clarification from engineer before proceeding.
D. The contractual relationship of the parties to the contract shall not be altered from the contract documents by mention or inference otherwise in any reference document.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE/CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship to produce work of specified quality.
B. Comply fully with manufacturer's instructions, including each step in sequence.
C. Should manufacturer's instructions conflict with contract documents, request clarification from the engineer prior to proceeding.
D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Perform work by persons qualified to produce workmanship of specified quality
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stress, vibration, physical distortion, or disfiguration.

3.02 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable work. Do not permit tolerances to accumulate.
B. Comply with manufacturers’ tolerances. Should manufacturers’ tolerances conflict with contract documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

3.03 DEFECT ASSESSMENT

A. Replace work or portions of work not conforming to specified requirements.

B. If, in the option of the Owner, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or recommend adjusted payment.

3.04 INSPECTION AND TESTING

A. Owner shall include and pay for all required special inspections and testing required by IBC Section 1705, if applicable. This does not include inspections and testing required by other specification sections in this Project Manual. Copies of all testing and inspection reports shall be submitted to the Construction Manager and Design Professional by the testing and inspection agency.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect, Construction Manager, and contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of contract documents.
   4. Immediately notify the Construction Manager and contractor of observed irregularities or non-conformance of work or products.
   5. Perform additional testing and inspections required by the Owner

C. Limits on Testing Agency/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirement of contract documents.
   2. Agency may not approve or accept any portion of the work.
   3. Agency may not assume any duties of the contractor.
   4. Agency has no authority to stop the work.

D. Contractor responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the work and to manufacturer’s facilities.
   3. Provide incidental labor and facilities:
      a. To provide access to work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of products to be tested/inspected.
      c. To facilitate test/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Construction Manager and laboratory 24 hours prior to expected time for operations requiring testing/inspection.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same testing agency on instruction by Architect/Construction Manager.

F. Re-testing required because of non-conformance to specified requirements shall be paid for by the Contractor.

3.05 MANUFACTURER'S FIELD SERVICES AND REPORTS

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

B. Individuals are to report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to the manufacturers' written instructions.

C. Submit report in duplicate within 30 days of observation to Construction Manager for review.

END OF SECTION

SECTION 01 45 00

SPECIAL INSPECTIONS AND TESTS

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 minimum 2024 International Building Code (IBC) required inspections and frequency of inspections.

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 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.

1.4 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. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
11. Name and signature of laboratory inspector.
12. Recommendations on retesting and reinspecting.

1.5 SPECIAL INSPECTIONS AND TESTS

A. Special Tests and Inspections: Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections included in this Section, and as follows:

B. 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.

C. 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. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
4. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

D. 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.

E. Testing Agency Responsibilities: Cooperate with Owner, Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Owner, Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
6. 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. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log.

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.

B. Protect construction exposed by or for inspection activities.

PART 4 - STATEMENT OF SPECIAL INSPECTIONS

4.1 Definitions:

A. Frequency of special inspections and tests:
1. P (Perform): Perform these tasks for each welded joint, bolted connection, or each member. (AISC 360 & AISC 341)
2. O (Observe): Observe these items on a random basis. Operations need not be delayed pending these inspections. (AISC 360 & AISC 341)
3. P (Perform): Perform these tasks prior to final acceptance for each item or element. (SDI QA/QC)
4. O (Observe): Inspect these items of an intermittent basis. Operations need not be delayed pending these inspection. (SDI QA/QC)
5. D (Document): The inspector shall prepare reports indicating that the work has been performed in accordance with the contract documents. Only required for structures designed per AISC 341 – Seismic Provisions for Structural Steel Buildings. (AISC 341)
6. C (Continuous): Continuous special inspections is the constant monitoring of specific tasks by a special inspector. These inspections must be carried out continuously over the duration of the particular tasks. (2015 IBC)
7. P (Periodic): Periodic special inspection is inspections by the special inspector who is intermittently present where the work has been or is being performed. (2015 IBC)

B. Wind and Seismic Resistance:
1. (*): Indicates special inspections required for wind resistance in the following areas:
   a. When Vasd is 120 miles per hour (52.8 m/sec) or greater in wind exposure category B.
   b. When Vasd is 110 miles per hour (52.8 m/sec) or greater in wind exposure category C or D.
2. (SE) Seismic Elements: Inspections required for seismic resistance only where the structure is designed per AISC 341 – Seismic Provisions for Structural Steel Buildings.
3. (**): Indicates special inspections required for seismic resistance in the following areas:
   a. Seismic force-resisting systems in structures assigned to Seismic Design Category (SDC) B, C, D, E or F.
   b. Designated seismic systems in structures assigned to Seismic Design Category C, D, E or F.
   c. Storage racks in structures assigned to Seismic Design Category D, E or F.
   d. Structural, architectural, mechanical and electrical components in structures assigned to Seismic Design Categories indicated.

4.2 Statement of Special Inspections and Test

Statement of Special Inspections and Test
2024 International Building Code
Project: Iowa DAS – DOC 4JD CBC New Central Office

A. Steel Construction (IBC: 1705.2)				
	1. Structural Steel (IBC: 1705.2.1; AISC 360; AISC 341)			
Required	Task	Perform	Observe	Referenced Standard
	Inspection Tasks Prior to Welding			
☒	a. Welding procedure specifications (WPSs) available.	P	-	AISC 360 - Table N5.4-1
☒	b. Manufacturer certifications for welding consumables available.	P	-	AISC 360 - Table N5.4-1
☒	c. Material identification (Type/Grade).	-	O	AISC 360 - Table N5.4-1, AISC 341 - Table J6-1
☒	d. Welder identification system.	-	O	AISC 360 - Table N5.4-1
☒	e. Fit-up of groove welds (including joint geometry).	-	O	AISC 360 - Table N5.4-1, AISC 341 - Table J6-1
☒	g. Fit-up of fillet welds.	-	O	AISC 360 - Table N5.4-1, AISC 341 - Table J6-1
	Inspection Tasks During Welding			
☒	h. Use of qualified welders.	-	O	AISC 360 - Table N5.4-2, AISC 341 - Table J6-2
☒	i. Control and handling of welding consumables.	-	O	AISC 360 - Table N5.4-2, AISC 341 - Table J6-2
☒	j. No welding over cracked tack welds.	-	O	AISC 360 - Table N5.4-2, AISC 341 - Table J6-2
☒	k. Environmental conditions.	-	O	AISC 360 - Table N5.4-2, AISC 341 - Table J6-2
☒	l. WPS followed.	-	O	AISC 360 - Table N5.4-2, AISC 341 - Table J6-2
☒	m. Welding techniques.	-	O	AISC 360 - Table N5.4-2, AISC 341 - Table J6-2
	Inspection Tasks After Welding			
☒	n. Welds cleaned.	-	O	AISC 360 - Table N5.4-3, AISC 341 - Table J6-3
☒	o. Size, length and location of welds.	P	-	AISC 360 - Table N5.4-3, AISC 341 - Table J6-3
☒	p. Welds meet visual acceptance criteria.	P, D	-	AISC 360 - Table N5.4-3, AISC 341 - Table J6-3
☒	t. Repair activities.	P, D	-	AISC 360 - Table N5.4-3, AISC 341 - Table J6-3
☒	u. Document acceptance or rejection of welded joint or member.	P	-	AISC 360 - Table N5.4-3
	Nondestructive Testing of Welded Joints			
☒	w. CJP welds (Risk Category II).	-	O	AISC 360 - N5.5b
	Prior to Bolting			
☒	gg. Manufacturer's certifications available for fastener materials.	P	-	AISC 360 - Table N5.6-1
☒	hh. Fasteners marked in accordance with ASTM requirements.	-	O	AISC 360 - Table N5.6-1

☒	ii. Proper fasteners selected for the joint detail.	-	O	AISC 360 - Table N5.6-1, AISC 341 - Table J7-1
☒	jj. Proper bolting procedure selected for joint detail.	-	O	AISC 360 - Table N5.6-1, AISC 341 - Table J7-1
☒	kk. Connecting elements, including the appropriate faying surface condition and hole preparation, if specified, meet applicable requirements.	-	O	AISC 360 - Table N5.6-1, AISC 341 - Table J7-1
☒	ll. Pre-installation verification testing by installation personnel observed and documented for fastener assemblies and methods used.	-	O, D	AISC 360 - Table N5.6-1, AISC 341 - Table J7-1
☒	mm. Proper storage provided for bolts, nuts, washers and other fastener components.	-	O	AISC 360 - Table N5.6-1, AISC 341 - Table J7-1
	Inspection Tasks During Bolting			
☒	nn. Fastener assemblies, of suitable condition, placed in all holes and washers (if required) are positioned as required.	-	O	AISC 360 - Table N5.6-2, AISC 341 - Table J7-2
☒	oo. Joint brought to the snug-tight condition prior to the pretensioning operation.	-	O	AISC 360 - Table N5.6-2, AISC 341 - Table J7-2
☒	pp. Fastener component not turned by the wrench prevented from rotating.	-	O	AISC 360 - Table N5.6-2, AISC 341 - Table J7-2
☒	qq. Fasteners are pretensioned in accordance with the RCSC Specification, progressing systematically from the most rigid point toward the free edges.	-	O	AISC 360 - Table N5.6-2, AISC 341 - Table J7-2
	Inspection Tasks After Bolting			
☒	rr. Document acceptance or rejection of bolted connections.	P, D	-	AISC 360 - Table N5.6-3, AISC 341 - Table J7-3
	Other Inspection Task			
☒	ss. Anchor rod and other embedments supporting structural steel.	P	-	AISC 360 - N5.7
☒	tt. Fabricated steel or erected steel frame.	-	O	AISC 360 - N5.7
	2. Cold-Formed Steel Deck (IBC: 1705.2.2, SDI QA/QC)			
Required	Verification and Inspection	Perform	Observe	Referenced Standard
	Inspection or Execution Tasks Prior to Deck Placement (SDI QA/QC Table 1.1)			
☒	a. Verify compliance of materials (deck and all deck accessories) with construction documents, including profiles, material properties, and base metal thickness.	P	-	

☒	b. Document acceptance or rejection of deck and deck accessories.	P	-	
	Inspection or Execution Tasks After Deck Placement (SDI QA/QC Table 1.2)			
☒	c. Verify compliance of deck and all deck accessories installation with construction documents.	P	-	
☒	d. Verify deck materials are represented by the mill certifications that comply with the construction documents.	P	-	
☒	e. Document acceptance or rejection of installation of deck and deck accessories.	P	-	
	Inspection or Execution Tasks Prior to Mechanical Fastening (SDI QA/QC Table 1.6)			
☒	r. Manufacturer installation instructions available for mechanical fasteners.	-	O	
☒	s. Proper tools available for fastener installation.	-	O	
☒	t. Proper storage for mechanical fasteners.	-	O	
	Inspection or Execution Tasks During to Mechanical Fastening (SDI QA/QC Table 1.7)			
☒	u. Fasteners are positioned as required.	-	O	
☒	v. Fasteners are installed in accordance with manufacturer's instructions.	-	O	
	Inspection or Execution Tasks After Mechanical Fastening (SDI QA/QC Table 1.8)			
☒	w. Check spacing, type, and installation of support fasteners.	P	-	
☒	x. Check spacing, type and installation of sidelap fasteners.	P	-	
☒	y. Check spacing, type, and installation of perimeter fasteners.	P	-	
☒	z. Verify repair activities.	P	-	
☒	aa. Document acceptance or rejection of mechanical fasteners.	P	-	

B. Concrete Construction (IBC: 1705.3)

1. Concrete Construction (IBC: Table 1705.3)

Required	Verification and Inspection	Continuous	Periodic	Referenced Standard	IBC Reference
☒	a. Inspection of reinforcing steel, including prestressing tendons, and placement.	-	P	ACI 318: Ch. 20, 25.2, 25.3, 26.5.1-26.5.3	1908.4
☒	e. Inspect anchors cast in concrete.	-	P	ACI 318: 17.8.2	

☒	f. Inspect anchors post-installed in hardened concrete members: Adhesive anchors installed in horizontally or upwardly inclined orientations to resist sustained tension loads.	C	-	ACI 318: 17.8.2.4	
☒	g. Inspect anchors post-installed in hardened concrete members: Mechanical anchors and adhesive anchors not defined in B.1.f	-	P	ACI 318: 17.8.2	
☒	h. Verify use of required design mix.	-	P	ACI 318: Ch. 19, 26.4.3, 26.4.4	1904.1, 1904.2, 1908.2, 1908.3
☒	i. Fresh concrete tests: refer to section 03 30 00 for tests.	C	-	ASTM C172, ASTM C31, ACI 318: 26.4.5, 26.12	1908.1
☒	j. Inspect concrete and shotcrete placement for proper application techniques.	C	-	ACI 318: 26.4.5	1908.6, 1908.7, 1908.8
☒	k. Verify maintenance of specified curing temperature and techniques.	-	P	ACI 318: 26.4.7-26.4.9	1908.9
☒	p. Inspect formwork for shape, location and dimensions of the concrete member being formed.	-	P	ACI 318: 26.10.1 (b)	

E. Soils (IBC: 1705.6)				
	1. Soils (IBC: Table 1705.6)			
Required	Verification and Inspection	Continuous	Periodic	Referenced Standard
☒	a. Verify materials below shallow foundation are adequate to achieve the design bearing capacity.	-	P	
☒	b. Verify excavations are extended to proper depth and have reached proper material.	-	P	
☒	c. Perform classification and testing of compacted fill materials.	-	P	
☒	d. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill.	C	-	
☒	e. Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly.	-	P	

END OF SECTION

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities
B. Temporary Sanitary Facilities (By Owner)
C. Telephone Service
D. Removal of Utilities, Facilities, and Controls
E. Temporary Facilities
F. Equipment
G. Vehicular Access and Parking
H. Traffic Regulation
I. Barriers
J. Enclosures and Fencing
K. Waste Removal

1.02 TEMPORARY UTILITIES

A. Owner will provide the following:
   1. Electrical Power, consisting of connection to existing facilities.
   2. Water Supply, consisting of connection to existing facilities.
B. The Contractor shall pay for installation, maintenance, and removal of temporary utilities. Temporary utilities shall not disrupt the Facility's need for continuous service.

1.03 TEMPORARY SANITARY FACILITIES (By Owner)

A. Provide and maintain required facilities and enclosures. (By Owner)
B. Maintain daily in clean and sanitary condition. (By Owner)

1.04 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field or use a cellular telephone.

1.05 REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 - PRODUCTS

2.01 TEMPORARY FACILITIES

A. Field Offices: Coordinate with Construction Manager and Owner if applicable.

2.02 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated, with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.01 VEHICULAR ACCESS AND PARKING

A. Use designated existing on-site roads for construction traffic.
B. Parking is as directed by Owner.
C. When site space is not adequate, provide additional off-site parking.
D. Use of designated existing on-site streets and driveways used for construction traffic is permitted. Track vehicles not allowed on paved areas.
E. Use of designated areas of existing parking facilities used by construction personnel as permitted.
F. Do not allow heavy vehicles or construction equipment in parking areas.
G. Provide and maintain access to fire hydrants, free of obstructions.
H. Provide means of removing mud from vehicle wheels before entering streets.

3.02 TRAFFIC REGULATION

A. Flag Persons: Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.
B. Flares and lights: Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
C. Haul Routes:
    1. Consult with authority having jurisdiction, establish public thoroughfares to be used for haul routes and site access.
D. Removal:
    1. Remove equipment and devices when no longer required.
    2. Repair damage caused by demolition.

3.03 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for Owner’s use of site and to protect existing facilities and adjacent properties from damage during construction operations.
B. Provide barricades and covered walkways required by governing authorities for public rights-of-way.
C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

3.04 ENCLOSURES AND FENCING

A. The owner will provide and install a six-foot-high fence around the construction site, equipped with vehicular and pedestrian gates with locks.
B. Revision, alteration, and re-setting of the six-foot-high construction fence (provided by owner) shall be completed by contractors.
C. Provide temporary enclosure and fences as necessary to protect the public and secure the site.
D. Provide security and facilities to protect work, existing facilities, and Owner’s operations from unauthorized entry, vandalism, or theft.

3.05 WASTE REMOVAL

A. Except for items or materials to be salvaged, recycled or otherwise reused, remove waste materials from project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
    1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
    2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
    3. Remove debris and waste materials from construction area daily.

B. Burning: Do not burn waste materials.
C. Waste Disposal Facilities: Provide waste collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.
D. Contractors shall be responsible for providing waste collection containers and conveying waste materials/construction debris from construction activities to the on-site dumpster.
E. Dumpster/Roll off service provided by owner.

END OF SECTION

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SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. General product requirements
B. Product options
C. Maintenance materials
D. Transportation and handling
E. Storage and protections

PART 2 - PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Provide new products unless specifically required or permitted by the contract documents.
B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's
   2. Made of wood from newly cut old growth timber.
C. Where all other criteria are met, contractor shall give preference to products that:
   1. If used on interior, have lower emissions
   2. If wet-applied, have lower VOC content
   3. Are extracted, harvested, and/or manufactured closer to the location of the project
   4. Have longer documented life span under normal used
   5. Result in less construction waste
   6. Are made of vegetable materials that are rapidly renewable

2.02 PRODUCT OPTIONS

1. Products specified by reference standards or by description only: Use of any product meeting those standards or description.
2. Products specified by naming one or more manufacturers, with or without a provision for substitutions: Use a product of one of the manufacturers named and meeting specifications or submit a request for substitution for any manufacturer not named by the date specified in this project manual. Substitution requests shall be emailed to the Issuing Officer at the email address provided in Instructions to Bidders Section 1.04.

2.03 MAINTENANCE MATERIALS

1. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
2. Deliver to project site; obtain receipt prior to final payment.

PART 3 - EXECUTION

3.01 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.
E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.02 STORAGE AND PROTECTIONS

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
B. Store and protect products in accordance with manufacturers' instructions.
C. Store with seals and labels intact and legible.
D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to the product.
E. For exterior storage of fabricated products, place on slopped supports above ground.
F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
G. Comply with manufacturers' warranty conditions, if any.
H. Cover product subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
I. Prevent contact with material that may cause corrosion, discoloration, or staining.
J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures
B. Alteration project procedures
C. Cutting and patching
D. Cleaning and protection
E. Adjusting

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 EXAMINATION, PREPARATION, AND GENERAL INSTALLATION PROCEDURES

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.
D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misproduction.
E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
F. Prior to cutting: Examine existing conditions prior to commencing work; include elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.
G. Clean substrate surfaces prior to applying next material or substance.
H. Seal cracks or openings of substrate prior to applying next material or substance.
I. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.
J. Install products as specified in individual sections, in accordance with manufacturer’s instructions and recommendations, and so as to avoid waste due to necessity for replacement.
K. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
L. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
M. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
N. Make neat transitions between different surfaces, maintaining texture and appearance.

3.02 ALTERATION PROJECT PROCEDURES

A. Materials: As specified in product sections match existing products and work for patching and extending work.
B. Employ skilled and experienced installer to perform alteration work.
C. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished work.
E. Remove, cut and patch work in a manner to minimize damage and to provide a means of restoring products and finished to original condition.

F. Remove debris and abandoned items from area and from concealed spaces.
G. Refinish visible existing surfaces to remain in renovated rooms and spaces to specified condition for each material with a neat transition to adjacent finishes.
H. Where new work abuts or aligns with existing, perform a smooth and even transition. Patched work to match existing adjacent work in texture and appearance.
I. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line of division and make recommendation to the Construction Manager. Prior to cutting get the Owner's approval.
J. Where change of plane of ¼ inch or more occurs, submit recommendation for providing smooth transition to the Construction Manager for review.

3.03 CUTTING AND PATCHING

A. Employ skilled and experienced installer to perform cutting and patching.
B. Submit written request in advance of cutting or altering elements which affect:
   1. Structural integrity of element.
   2. Integrity of weather-exposed or moisture-resistant elements.
   3. Efficiency, maintenance, or safety of element.
   4. Visual qualities of sight exposed elements.
   5. Work of owner or separate contractor.
C. Execute cutting, fitting, and patching to complete work, and to:
   1. Fit the several parts together, to integrate with other work.
   2. Uncover work to install or correct ill-timed work.
   3. Remove and replace defective and non-conforming work.
   4. Remove samples of installed work for testing.
   5. Provide openings in elements of work for penetrations of mechanical and electrical work.
D. Execute work by methods to avoid damage to other work and which will provide proper surfaces to receive patching and finishing.
E. Cut rigid materials using masonry saw or core drill.
F. Cut masonry and concrete materials using masonry saw or core drill.
G. Restore work with new products in accordance with requirements of Contract Documents.
H. Fit work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
I. Maintain integrity of wall, ceiling or floor construction; completely seal voids.
J. Refinish surfaces to match adjacent finishes. Refinish to nearest intersection for continuous surfaces. Refinish entire unit for continuous surfaces for an assembly.
K. Identify hazardous substances or conditions exposed during the work to the engineer for decision or remedy.

3.04 CLEANING AND PROTECTION

A. Progress cleaning
   1. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
   2. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.
B. Protection of installed work
   1. Protect installed work from damage by construction operations.
   2. Provide special protection where specified in individual specification sections.
   3. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
   4. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.
   5. Prohibit traffic from landscaped areas.

3.05 ADJUSTING

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

END OF SECTION

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Inspections
B. Substantial Completion
C. Project Record Documents
D. Warranties
E. Operations and Maintenance Manuals
F. Operations and Maintenance Data for Materials and Finishes
G. Operations and Maintenance Data for Equipment and Systems
H. Training
I. Final Completion
J. Maintenance

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 INSPECTIONS

A. Ensure all state inspections have been completed by the authority having jurisdiction.
B. Upload documentation of all test/inspections to Procore.
C. Submit a written request for inspection of Substantial Completion. On receipt of request, The Design Professional will either proceed with inspection or notify contractor of unfulfilled requirements. The Design Professional 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. Re-inspection: Request re inspection 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.

3.02 SUBSTANTIAL COMPLETION

A. A substantial completion checklist is attached for reference following this specification section.
B. Make submittals that are required by governing or other authorities.
    1. Provide copies to the Construction Manager through upload to Procore.
C. Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
    1. Submit written certification that contract documents have been reviewed, work has be inspected, and that work is completed in accordance with contract documents and ready for review
    2. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the work has not been completed.
    3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
    4. Make final changeover of permanent locks and deliver key to the owner. Advise owner's personnel of changeover in security provisions.
    5. Complete startup testing of systems.
    6. Submit test/adjust, balance records.
    7. Terminate and remove temporary facilities from project site, along with mockups, construction tools, and similar elements.

8. Advise owner of changeover in heat and other utilities.
9. Submit changeover information related to owner's occupancy, use, operation, and maintenance.
10. Complete final cleaning requirements, including touch up painting.
11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

3.03 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the work:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change orders and other modifications to the contract
   5. Reviewed shop drawings, product data, and samples
B. Ensure entries are complete and accurate, enabling future reference by Owner.
C. Store record documents separate from documents used for construction.
D. Record information concurrent with construction progress, not less than weekly.
E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer’s name and product model and number.
   2. Product substitutions or alterations utilized.
   3. Changes made by Addenda and modifications.
F. Record Drawings:
   1. Measured depths of foundations in relation to finish first floor datum.
   2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the work.
   4. Field changes of dimension and detail.
   5. Details not on original contract drawings.
G. Record Drawings shall be uploaded to Procore in pdf format.

3.04 WARRANTIES

A. Submit written warranties for designated portions of the work where commencement of warranties other than date of Substantial Completion is indicated.
B. Submit properly executed warranties in Procore prior to Final Completion.
C. Verify that documents are in proper form, contain full information, and are notarized.
D. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
E. Include warranties in operation and maintenance manuals.
F. Items of work delayed beyond date of Substantial Completion, provide updated submittal after acceptance by Owner, listing date of acceptance as start of warranty period

3.05 OPERATIONS AND MAINTENANCE MANUALS

A. Format: Submit operations and maintenance manuals in the following format:
   1. Portable Document Format (PDF) electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Owner and upload to Procore.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.

2. Assemble with data arranged in the same sequence as, and identified by the specification sections. Where systems involve more than one specification section, provide separate index for each system.
3. Include project directory listing title and address of project, names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
4. Include Table of Contents listing every item separated by index and specification section.

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

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

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use project record documents as maintenance drawings.

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

3.06 OPERATIONS AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For each product, applied material, and finish:
1. Product data, with catalog number, size, composition, and color and texture designations.
2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture protection and weather-exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.

D. Additional information as specified in individual product specification sections.

E. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specified products.

3.07 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For each item of equipment and each system:
1. Description of unit or system, and component parts
2. Identify function, normal operating characteristics, and limiting conditions
3. Include performance curves, with engineering data and tests
4. Complete nomenclature and model number of replacement parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specified products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Include color coded wiring diagrams as installed.

E. Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

F. Maintenance requirements: Include routine procedure and guide for preventative maintenance and troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

G. Provide servicing and lubrication schedule and list of lubricants required.

H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.

J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
K. Provide control diagrams by controls manufacturer as installed.
L. Provide contractor's coordination drawings, with color coded piping diagrams as installed.
M. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
N. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
O. Include test and balancing reports.
P. Additional requirements: As specified in individual specification sections.

3.08 TRAINING

A. Demonstrate operations of systems, subsystems, and equipment.
B. Train in operation and maintenance of systems, subsystems, and equipment
C. 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.
D. Submit written agenda to Construction Manager for approval prior to scheduling training.
E. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

3.09 FINAL COMPLETION

A. A final completion checklist is attached for reference following this specification section.
B. Before requesting final inspection for determining date of Final Completion, complete the following:
   1. Complete punch list items.
   2. Prepare and submit project record documents, operation and maintenance manuals, damage or settlement surveys, and similar final record information.
   3. Deliver tools, spare parts, extra materials, and similar items to location designated by owner. Label with manufacturer's name and model number where applicable.
   4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
   5. All trailers, construction signs, unused, broken or demolition materials have been removed from the site and the premises returned to the original condition in the opinion of the Owner and Design Professional.
   6. Submit a final Application for Payment (retainage).
C. Upon receipt of final payment complete final completion certificate in Procore.

END OF SECTION

Substantial Completion Project Checklist

Date: _____

DAS Project Number: _____
Project Title: _____
Location: _____
Contractor: _____

In order to process the 99% payment (100% pay app less closeout and retainage) on a Capital Project, the Department of Administrative Services needs the following information. Please complete this form and obtain the necessary documents.

Have all state inspections been completed and documentation uploaded to Procore?
(Including but not limited to the following inspections)

Boiler Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Water Heater Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Energy Code Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Building Code Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Electrical Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Elevator Inspection	❑ **Yes**	❑ **No**	❑ **N/A**
Other: _____	❑ **Yes**	❑ **No**	❑ **N/A**

❑ **Occupancy Permit if applicable**

❑ **Test and Balance has been performed**

❑ **Certificate of Substantial Completion in Procore (Consensus Docs 814)**

Are there any disputes with the above mentioned vendor which need resolution?
❑ **Yes (provide description below)** ❑ **No**

_____

_____

Can payment (less closeout and retainage) be released? ❑ **Yes** ❑ **No**

Final Completion Project Checklist

Date: _____

DAS Project Number: _____
Project Title: _____
Location: _____
Contractor: _____

In order to process the 100% payment and Retainage payment on a Capital Project, the Department of Administrative Services needs the following information. Please complete this form and obtain the necessary documents.

Have all Warranties been received? ❑ **Yes** ❑ **No**

Have the Operations and Maintenance Manuals been received? ❑ **Yes** ❑ **No**

Who is in possession of the O & M Manuals? _____

Has all training been completed? ❑ **Yes** ❑ **No**

Have all as-built drawings been scanned and uploaded into Procore? ❑ **Yes** ❑ **No**

Have electronic drawing/specification files been transferred to DAS? ❑ **Yes** ❑ **No**

Have all Test & Balance reports been received? ❑ **Yes** ❑ **No**

Have all punchlist items been corrected? ❑ **Yes** ❑ **No**

❑ **573 Notification** *(To be obtained from the general contractor):* Copy of general contractor's notification of application for retainage to all subcontractors and suppliers. General contractor must follow IAC 26 section 23.13.2.

❑ **AIA Form G706 – Contractor's Affidavit of Payment of Debts and Claims**

❑ **AIA Form G706A – Contractor's Affidavit of Release of Liens**

❑ **AIA Form G707 – Consent of Surety Company to Final Payment**

❑ **Certificate of Final Completion in Procore (Consensus Docs 815)**

Are there any disputes with the above mentioned vendor which need resolution?
❑ **Yes (provide description below)** ❑ **No**

_____

_____

Can 100% payment and retainage payment be released? ❑ **Yes** ❑ **No**

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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.

B. Related Requirements:

1. Section 033570 “Concrete Floor Finishes”.
2. Section 072700 “Under-Slab Vapor Barrier”
3. Section 312005 "Earth Moving for Building" for drainage fill under slabs-on-grade.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, 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.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.
2. Material Certificates: For each of the following, signed by manufacturers:
   a. Cementitious materials.
3. Material Test Reports: For the following, from a qualified testing agency:
   a. Aggregates.

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. Indicate locations of both construction joints and control joints.

1. Location of construction joints is subject to approval of the Architect.

1.5 QUALITY ASSURANCE

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

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

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIOfNS

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.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

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 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

    a. High-density overlay, Class 1 or better.
    b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    c. Structural 1, B-B or better; mill oiled and edge sealed.
    d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

3. Overlaid Finnish birch plywood.

B. 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.

C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

E. 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.

F. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. 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. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

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

2. Fly Ash: ASTM C 618, Class F or C.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

4. Blended Hydraulic Cement: ASTM C 595/C 595M, Type IL, portland-limestone cement.

5. Silica Fume: ASTM C 1240, amorphous silica.

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

1. Maximum Coarse-Aggregate Size: 1 inch nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

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

E. 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.

F. Water: ASTM C 94/C 94M and potable.

2.6 VAPOR RETARDERS

A. Refer to Section 07 27 00 “Under-Slab Vapor Barrier”.

2.7 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.8 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: Thickness as indicated, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

1. Material:
   a. ASTM D 1751, asphalt-saturated sellulosic fiber.
   b. Closed-cell, non-absorbent, compressible polyethylene or polymer foam.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types I and II, nonload bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.9 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) 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 (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface 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 topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) 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 (ACI 301M).

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: 50 percent.
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

5. Silica Fume: 10 percent.

6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, and concrete with a w/c ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: 3000 psi (20.7 MPa) at 28 days.

2. Maximum W/C Ratio: 0.50.

3. Slump Limit: Up to 6 inches for concrete with verified slump of 2 to 4 inches before adding water-reducing admixture or plasticizing admixture.

4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.

B. Foundation Walls: Normal-weight concrete.

1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.

2. Maximum W/C Ratio: 0.50.

3. Slump Limit: Up to 9 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding water-reducing admixture or plasticizing admixture.

4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.

C. Interior Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.

2. Maximum W/C Ratio: 0.50.

3. Slump Limit: Up to 6 inches for concrete with verified slump of 2 to 4 inches before adding water-reducing admixture or plasticizing admixture.

4. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Exterior Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 5000 psi at 28 days.

2. Maximum W/C Ratio: 0.50.

3. Slump Limit: Up to 6 inches for concrete with verified slump of 2 to 4 inches before adding water-reducing admixture or plasticizing admixture.

4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.

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.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), 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 (ACI 117M).

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.

2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.

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. 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. Refer to Section 07 27 00 “Under-Slab Vapor Barrier”.

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.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

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.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

3. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-third of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

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.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete 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 (ACI 301M).
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 (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.
3. Concrete Slab on Grade: Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Elevated Concrete Slab on Metal Deck: Place concrete to indicated thickness.
5. Slope surfaces uniformly to drains where required.
6. 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.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Concrete Slab on Grade: Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

   a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.

3. Concrete Slab on Metal Deck: Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

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.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

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 (ACI 301M) 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 (1 kg/sq. m 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. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Initial Curing: Initial curing refers to the cutting procedures implemented anytime between concrete placement and final finishing of the concrete surface to reduce moisture loss from the surface.
    a. Fogging: Fog spray the concrete surface with the spray directed above, not at, the concrete surface. Do not allow the water to pond on the surface and do not work accumulated water into the surface during the finishing process.
    b. Liquid-applied evaporation reducers: Apply using application rate and method recommended by the manufacturer.
2. Intermediate Curing: Intermediate curing refers to the curing procedures implemented when finishing is completed, but before the concrete has reached final set. During this period, surface evaporation may need to be reduced, but the concrete may not yet be able to tolerate the direct application of water or the mechanical damage resulting from the application of coverings.
    a. Fogging: Fog spray the concrete surface with the spray directed above, not at, the concrete surface.
    b. Liquid-Applied Evaporation Reducers: Apply using application rate recommended by the manufacturer.
    c. Curing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
3. Final Curing: Final Curing refers to the curing procedures implemented after final finishing, and after the concrete has reached final set. Apply final curing method before surface is dry.
    a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
    b. Saturated Burlap: Saturate burlap-polyethylene, and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
    c. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for four (4) days.

d. Straying: Spray water over floor slab areas, and maintain wet.

e. Curing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.12 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(s). 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 (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 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 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections: Refer to Section 01 4500 “Special Inspections and Tests” for required verifications and inspections.

A. 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 for the first 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. 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.
4. 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.
5. Compression Test Specimens: ASTM C 31/C 31M.
    a. Cast and laboratory cure four standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimens at 7 days, two specimens at 28 days, and one specimen retained in reserve for later testing if required.
    a. 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.
7. 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.
8. 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.
9. 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.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

B. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

3.15 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

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SECTION 03 3570

CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete sealer, hardener, and slip resistant treatment.

1.2 SUBMITTALS

A. Product Data.

PART 2 PRODUCTS

2.1 COMPOUNDS, HARDENERS, SEALERS, AND TREATMENT MATERIALS

A. Penetrating Liquid Densifier/Sealer Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic siliconate materials and proprietary components, with minimum solids content of 20 percent, of which not less than 50 percent is siliconate; odorless; that penetrates, hardens, densifies concrete surfaces, and adds sealing protection.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Euclid Chemical Company (The); an RPM company; EUCOSIL or a comparable product by one of the following or approved equal:
      a. L&M Construction Chemicals, Inc.
      b. Master Builders Solutions by BASF.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 FINISH

A. Hard Trowel, typical.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare concrete for finish in accordance with ICRI standards and densifier/sealer manufacturer requirements.

3.2 FLOOR FINISHING

A. Finish concrete floors in accordance with ACI 302 and 304.

B. Uniformly spread, screed, and float concrete. Do not use grate tampers or mesh rollers. Do not spread concrete by vibration.

C. Steel trowel surfaces which will be left exposed.

3.3 TOLERANCES

A. Maintain surface flatness as specified in Section 03 3000.

3.4 PROTECTING AND CURING

A. Protect exposed surfaces from premature drying.

B. Protect freshly placed concrete against wash by rain.

C. Protect concrete surface from drying for seven continuous days after placement, including weekends and holidays; alternate cycles of wetting and drying not permitted.

D. Acceptable Methods of Initial Curing (first 48 hours):
   1. Cover with fabric mats and keep wet during curing period.
   2. Maintain surface moist with fog mist applied by purpose- designed equipment.

E. At end of initial curing period (first 48 hours), before allowing concrete to dry, rinse and flush surface to remove reaction products.

F. Additional Acceptable Methods for Subsequent Curing (after first 48 hours):
   1. Cover with waterproof paper; ASTM C171.
   2. Cover with clear or white polyethylene sheets, 0.004 inch thick; lap edges minimum 4 inches and seal with tape.
   3. Seal with specified curing compound; comply with manufacturer's instructions.
   4. Where floor hardener is required, ensure compatibility prior to application of hardener over cured concrete (apply no concrete curing or hardening agents to concrete slab surfaces to receive resilient flooring).

G. Protect freshly placed concrete from all traffic, including Contractor's vehicles, until 75 percent of design strength is attained.

3.5 FLOOR HARDENER AND SEALER

A. Apply liquid chemical floor hardener and sealer on all exposed concrete floor surfaces. Apply 1 coat in accordance with manufacturer's instructions. Repeat application procedure to porous areas to assure a uniform finish.

END OF SECTION

SECTION 04 2213

FACE BRICK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes unit masonry assemblies consisting of the following:
   1. Face brick.
   2. Mortar and grout.
   3. Ties and anchors.
   4. Embedded flashing.
   5. Miscellaneous masonry accessories.

1.2 SUBMITTALS

A. Product Data: For each different masonry unit, accessory, and other manufactured product specified.
   1. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
      a. Mortar complying with property requirements of ASTM C 270.
      b. Concrete masonry units: Test report as required by Article 3.16.
   2. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

B. Samples for Initial Selection: For the following:
   1. Brick Samples in small-scale form showing the full range of colors and textures available for each different exposed masonry unit required.
   2. Colored mortar Samples showing the full range of colors available.

1.3 QUALITY ASSURANCE

A. Source Limitations for Masonry Units: Obtain exposed masonry units of uniform texture and color, or uniform blend within ranges accepted for these characteristics, through one source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

1.4 MOCKUPS

A. Before installing face brick, build mockups to verify selections made under sample submittals and demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with following requirements, using materials indicated for completed Work:
   1. Locate mockups in locations directed by Architect.
   2. Build mockups for types of masonry in sizes approximately 48 inches long by 72 inches high by full thickness, including face and backup wythes and accessories. Include sealant-filled joint at least 16 inches long in each mockup; include soldier-coursing for face brick assembly.

a. Each type of exposed face brick construction.
b. Typical exterior masonry-veneer wall complete with concrete block back-up, insulation, veneer ties, flashing, and weep holes.

3. Clean exposed faces of mockups with masonry cleaner as indicated.
4. Notify the Architect seven days in advance of dates and times when mockups will be constructed.
5. Protect accepted mockups from elements with weather-resistant membrane.
6. Maintain mockups during construction in undisturbed condition as standard for judging completed Work.
7. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
   a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
8. Demolish and remove mockups when directed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in dry location. If units are not stored in enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until dry.

B. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in dry location or in metal dispensing silo with weatherproof cover.

C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.6 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
   1. Extend cover minimum of 24 inches down both sides and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
   1. Protect the base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
   2. Protect sills, ledges, and projections from mortar droppings.
   3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
   4. Turn scaffold boards near wall on edge at end of each day to prevent rain from splashing

mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace face brick damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40°F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

E. Hot-Weather Requirements: Protect face brick work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required.
   1. When ambient temperature exceeds 100°F, or 90°F with wind velocity greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one minute of spreading mortar.

PART 2 PRODUCTS

2.1 BRICK

A. Face Brick: ASTM C 216, Grade SW, Type FBX, and as follows:
   1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
   2. Efflorescence: Provide brick tested according to ASTM C 67 and rated "not effloresced".
   3. Size: Manufacture to following actual dimensions:
      a. Utility: 3-5/8 inches wide, by 3-5/8 inches high, by 11-5/8 inches long.
   4. Application: Use where brick is exposed, unless otherwise indicated.
   5. Products: Subject to compliance with requirements, provide following:
      a. Color and Texture equivalent to “ 1-Carbon Black Velour” as manufactured by Sioux City Brick.
   6. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 MORTAR AND GROUT MATERIALS

A. Masonry Mortar: Type N compliant with ASTM C270. Minimum compressive strength = 1,800 psi at 28 days.

B. Masonry Grout: 2000 psi minimum compressive strength compliant with ASTM C476.

C. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
   1. For pigmented mortar, use colored cement formulation as required to produce color selected from manufacturer's standard formulations.

D. Aggregate for Mortar: ASTM C 144; except for joints less than 1/4-inch-thick, use aggregate graded with 100 percent passing the No. 16 sieve.

E. Cold-Weather Admixture: Non-chloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

F. Water: Potable.

G. Mortar Pigments and Admixtures, Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
   1. Colored Portland Cement-Lime Mix: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with record of satisfactory performance in masonry mortar:
      a. Color 3, Exterior Face Brick: Equivalent to Tamms Industries Company, as selected by Architect.
   2. Cold-Weather Admixture (if required):
      a. Accelguard 80; Euclid Chemical Co.
      b. Morseled; W. R. Grace & Co., Construction Products Division.
      c. Trimix-NCA; Master Builder Solutions, BASF.

2.3 MASONRY JOINT REINFORCEMENT

A. General: ASTM A 951 and as follows:
   1. Hot-dip galvanized, carbon-steel wire for both interior and exterior walls.
   2. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units where indicated.
   3. Minimum 9 gage side rods and truss rods.

2.4 TIES AND ANCHORS, GENERAL

A. General: Provide ties and anchors, specified in subsequent articles, made from materials that comply with this Article, unless otherwise indicated.

B. Hot-Dip Galvanized Carbon-Steel Wire: ASTM A 82; with ASTM A 153, Class B-2 coating.

2.5 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall for attachment over sheathing to wood or metal studs, and as follows:
   1. Structural Performance Characteristics: Capable of withstanding 100-lbf load in both tension and compression without deforming or developing play more than 0.05-inch.

B. Products: Subject to compliance with requirements, provide the following:
   1. Screw-Attached, Masonry-Veneer Anchors:
      a. Basis of Design: '2-Seal Thermal Wing Nut Anchor for metal stud backup wall' as manufactured by Hohmann & Barnard.
      b. Thickness: Contractor verifies necessary thickness with anchor manufacturer.
      c. Spacing: Provide at least one anchor for each 2.67ft² of wall surface. Install anchors at 16 inches o.c. horizontally and 24 inches o.c. maximum vertically. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches around perimeter.
      d. Install through mineral wool board insulation and directly into metal stud framing. Do not over-compress mineral wool board insulation more than 1/4" from the face of insulation board.

2.6 ADJUSTABLE MASONRY-VENEER ANCHORS

A. General: Provide two-piece assemblies that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
   1. Structural Performance Characteristics: Capable of withstanding 100-lbf load in both tension and compression without deforming or developing play more than 0.05-inch.

B. Screw-Attached, Masonry-Veneer Anchors: Units consisting of wire tie section and metal anchor section complying with following requirements:
   1. Anchor Section: Sheet metal plate with screw holes top and bottom and with raised rib-stiffened strap stamped into center to provide slot between strap and plate for connection of wire tie. For use at OSB or plywood: Equivalent to Hohmann & Barnard DW-10HS; 12-gauge.
      a. Plate 1-1/4-inches-wide by 9-inches-long with strap 5/8-inch-wide by 5-1/2-inches-long; slot clearance formed between face of plate and back of strap not to exceed diameter of wire tie by more than 1/32-inch.
      b. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and to prevent moisture from penetrating sheathing at pronged legs and screw holes.

C. Products: Subject to compliance with requirements, provide following:
   1. Screw-Attached, Masonry-Veneer Anchors:
      a. Equivalent to “X-Seal” for 1” rigid insulation, Hohmann & Barnard, Inc.
      b. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.7 THRU-WALL MEMBRANE FLASHING

A. Flexible EPDM Flashing.
   1. Basis of Design: Firestone “Enverge FlashGard Thru-Wall Reinforced Flashing Membrane. Tested to ASTM D 4637 for Type II scrim-reinforced EPDM single-ply membranes. Equivalent products accepted.
      a. Thickness: 0.050 min ± 20%.
      b. Color: Black.
      c. Width: 10.00” + 0”/-0.1245”.
      d. Coating over scrim: 0.022”.
      e. Breaking strength: 232 lbf, minimum.
      f. Elongation, ultimate: 475% minimum.
      g. Tearing Strength: 81 lbf min.
      h. Brittleness point: -65° F max.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.8 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing where flashing is exposed or partly exposed and where indicated, complying with Division 07 Section "Sheet Metal Flashing and Trim".
   1. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and outer face as shown on drawings.
   2. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least 3 inches into the wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4-inch and down into joint 3/8-inch to form stop for retaining sealant backer rod.
   3. Metal Expansion-Joint Strips: Fabricate from stainless steel to shapes indicated.

B. Flexible Flashing: For flashing not exposed to exterior, use one of following unless otherwise indicated:
   1. Butyl Flashing: Synthetic butyl compound integrally laminated to white engineered polypropylene film surface. Basis of Design: Blueskin Butyl Flash.
      a. Elongation, minimum: 825% tested per ASTM D882.
      b. Tensile Strength, minimum: 2500 psi tested per ASTM D882.
      c. Low Temperature Flexibility @ 20°F: Pass, tested per ASTM D1970.
      d. Nail Sealability: Pass, tested per ASTM D1970.
   2. Other Approved Manufacturers provided product meets Basis of Design.
      a. Carlisle Coatings & Waterproofing.
      b. Dayton Superior Corporation, Dur-O-Wal Division.
      c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.
      d. Heckmann Building Products Inc.
      e. Hohmann & Barnard, Inc.
      f. Polyguard Products, Inc.
   3. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

C. Termination bar equivalent to Hohmann & Barnard, Inc. type T1 (use at metal stud walls).
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim".

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from urethane.

B. Preformed Control-Joint Gaskets: Designed to fit standard sash block and to maintain lateral stability in masonry wall. Made from styrene-butadiene-rubber compound complying with ASTM D 2000, Designation M2AA-805.

C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

D. Weep/Vent Products: Free-draining mesh, made from 90% open weave polyester mesh with antimicrobial and flame-retardant additives.

E. Masonry Cleaner:
   1. Non-Acidic cleaner equivalent to Sure-Klean Vana Trol; Pro So Co, Inc.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

F. Cavity Drainage Material: Thickness to suit cavity (refer to Drawings) free-draining mesh; made from polyethylene strands and shaped to avoid clogging by mortar droppings.

G. Water Repellent:
   1. Basis of Design: Sure-Klean Custom Masonry Sealer by Prosoco.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

H. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Form units from 0.142-inch steel wire, hot-dip galvanized after fabrication.
   1. Provide units with either two loops or four loops as needed for number of bars indicated.

I. Available Products: Subject to compliance with requirements, cavity drainage materials that may be incorporated into the Work include, but are not limited to, the following:
   1. Cavity Drainage Material:
      a. Mortar Break; Advanced Building Products, Inc.
      b. CavClear Masonry Mat; CavClear.
      c. Mortar Net; Mortar Net USA, Ltd.
      d. Mortar Stop; Polytite Manufacturing Corp.
      e. Advanced Building Products Inc., Mortar Maze.
   2. Reinforcing Bar Positioners:
      a. D/A 811; Dur-O-Wal, Inc.
      b. D/A 816; Dur-O-Wal, Inc.
      c. No. 376 Rebar Positioner; Heckman Building Products, Inc.
      d. #RB Rebar Positioner; Hohmann & Barnard, Inc.
      e. #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
   3. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.10 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
   1. Do not use calcium chloride in mortar or grout.
   2. Add cold-weather admixture (if used) at the same rate for all mortar, regardless of weather conditions, to ensure consistent mortar color.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of preblended mix. Measure quantities by weight to ensure accurate proportions and thoroughly blend ingredients before delivering to project site.
   1. Prepare “DRY BLOCK” mortar for all Split-Face Veneer walls, Type M or S only, according to admix manufacturer’s recommendations for water repellency and bond strength. Mortar preparation and composition to comply with ASTM C270, Type M or S.

2.11 INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, closed-cell product extruded with an integral skin. 2” thickness. See Specification Section 07 2100.

B. Above Grade; see Wall Types for insulation type and thickness and Specification Section 07 2100.

C. At-Grade Thru-Wall Flashing; provide Extruded-Polystyrene Board Insulation with thickness to match Wall Assembly insulation above. See Specification Section 07 2100.

D. Below Grade: provide Extruded-Polystyrene Board Insulation with 2” thickness. See Specification Section 07 2100.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this Section and in other Sections of the Specifications.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide a continuous pattern and fit adjoining construction. Where possible, use full-size units without cutting. Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units with cut surfaces and, where possible, conceal cut edges.

E. Select and arrange units for exposed face brick to produce uniform blend of colors and textures.

F. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

3.3 CONSTRUCTION TOLERANCES

A. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and following:
   1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4-inch in 20 feet, nor 1/2-inch maximum.
   2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4-inch in 10 feet, nor 1/2-inch maximum.
   3. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4-inch in 20 feet, nor 1/2-inch maximum.
   4. If Type FBS Rough or Type FBA brick is used, revise tolerances below to allow for variation in brick size. Consider restricting tolerances if Type FBX brick is used.
   5. For exposed bed joints, do not vary from thickness indicated by more than ± 1/8-inch, with a maximum thickness limited to 1/2-inch. Do not vary from bed-joint thickness of adjacent courses by more than 1/8-inch.
   6. For exposed head joints, do not vary from thickness indicated by more than ± 1/8-inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8-inch.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Lay exposed masonry in following bond pattern; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
   1. Running bond with vertical joint in each course centered on units in courses above and below.

C. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

E. Fill space between hollow-metal frames and masonry solidly with mortar, unless otherwise indicated.

3.5 MORTAR MIXING

A. Proportion mortar by dry volume using accurately calibrated equipment similar and equal to equipment manufactured by VOL-CON, Davenport, IA, (319) 383-1856; measurement by shovel not permitted. Machine mix for at least 3 minutes and not over 5 minutes with maximum amount of water to produce workable consistency.

B. Proportion “DRY BLOCK” admix according to manufacturer’s recommendations.

C. Do not use admixtures to lower freezing point of mortars.

D. Use mortar within 2-1/2 hours after initial mixing. When necessary, re-temper mortar within 2 hours from mixing to replace water lost by evaporation. Do not use mortar or grout after it has begun to set.

3.6 MORTAR BEDDING AND JOINTING

A. Lay hollow masonry units as follows:
   1. With full mortar coverage on horizontal and vertical face shells.
   2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout.
   3. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

B. At cavity walls, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick.

C. Tool exposed joints slightly concave when thumbprint hard, using jointer larger than the joint thickness, unless otherwise indicated.

3.7 CAVITIES

A. Keep cavities clean of mortar droppings and other materials during construction.
   1. Use wood strips temporarily placed in cavities to collect mortar droppings. As work progresses, remove strips, clean off mortar droppings, and replace in cavity.

3.8 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
   1. Provide open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
   2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
   3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.9 ANCHORING MASONRY VENEERS

A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
   1. Fasten each anchor section through sheathing to wall framing with two metal fasteners of type indicated.
   2. Embed tie sections in masonry joints. Provide air space between back of masonry veneer and face of sheathing.
   3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
   4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally, with not less than 1 anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals not exceeding 8 inches around perimeter.

3.10 CONTROL AND EXPANSION JOINTS

A. General: Install control and expansion joints in face brick where indicated in accordance with manufacturer’s instructions. Build-in related items as masonry progresses. Do not form continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form expansion joints in brick as follows:
   1. Form open joint of width is indicated, but not less than 3/8-inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants". Keep joint free and clear of mortar.

C. Provide expansion joints in exterior brick masonry where indicated on drawings not to exceed 30'-0" intervals. Locate to extend upward from ends of lintels and over expansion or control joints in backup.

D. Locate control joints in concrete face brick maximum 25 feet o.c. and back of brick expansion joints. In cavity walls offset 4" to 8" from direct alignment with brick expansion joint.

E. Install control joint strip in continuous lengths as walls are laid. Heat solvent weld butt and corner joints in accordance with manufacturer's instructions.

F. Keep joint gap free from mortar or debris.

G. Provide control/ expansion joint at interface between Cast Stone components and Brick Assembly: Compressible Filler and Preformed Control-Joint Gasketing.

3.11 LINTELS

A. Install steel lintels where indicated.

B. Provide a minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.12 FLASHING, WEEP HOLES, AND VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

B. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Unless otherwise indicated, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

C. Install flashing as follows:
   1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
   2. At lintels and shelf angles, extend flashing minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
   3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2-inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
   4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2-inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.

D. Install weep vent in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
   1. Space weep holes 24 inches o.c.

E. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.

3.13 REPAIRING, POINTING, CLEANING AND SEALING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During joint tooling, enlarge voids and holes except weep holes and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application.

C. In-Progress Cleaning: Clean face brick as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
   1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
   2. Test cleaning methods on sample wall panel.
   3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
   4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
   5. Clean masonry with specified cleaner applied according to manufacturer's written instructions.
   6. Following cleaning and preparation procedures, apply water repellent weatherproofing materials in accordance with manufacturer’s instructions.

3.14 MASONRY WASTE DISPOSAL

A. Recycling: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of face brick work, remove from Project site.

END OF SECTION

SECTION 051200

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Grout.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other steel items not defined as structural steel.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 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 anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.

5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Welding certificates.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Must comply with at least one of the following:

1. Company participating in the AISC Quality Certification Program, and is designated an AISC-certified plant, Certified Building Fabricator Category BU.
2. Company that specializes in performing the work of this section. The Fabricator shall indicate compliance with these qualifications requirements and as follows:

    a. Fabricator shall select a Special Inspection Company; and shall provide access to the Fabricator’s shop for Special Inspector to perform inspection required by IBC 2015 Chapter 1705 and according to section 01 45 00 “STRUCTURAL TESTS AND SPECIAL INSPECTIONS.”
    b. Cost of the Special Inspector, and related travel expenses for inspection at the Fabricator’s shop, shall be paid by the Fabricator.

A. Installer Qualifications: Must comply with at least one of the following:

1. Company participating in the AISC Quality Certification Program, and is designated an AISC-certified erector, Category CSE.
2. Company that specializes in performing the work of this section.

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

C. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.

2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles Shapes: ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.

E. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.

B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
4. Finish: Plain.

2.3 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
   1. Fabricate beams with rolling camber up.
   2. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   3. Mark and match-mark materials for field assembly.
   4. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
   1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 2, "Hand Tool Cleaning." Or SSPC-SP 3, "Power Tool Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to one of the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2. Galvanize lintels attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. Provide source quality control according to corresponding Fabricator qualification:

1. AISC Certified Plant:

a. Provide Certificate of Compliance for documentation that the fabricated work is performed in accordance with the Contract Documents.

2. Non-AISC Certified Plant:

a. Engage a qualified Testing Agency to perform shop tests and inspections according to section 01 45 00 “STRUCTURAL TESTS AND SPECIAL INSPECTIONS.” Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

2. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform special inspections

B. Inspections: Refer to Section 01 4500 “Special Inspections and Tests” for required verifications and inspections.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION

SECTION 053100

STEEL DECKING

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. Roof deck.
2. Noncomposite form deck.

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for normal-weight structural concrete fill over steel deck.
2. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of steel deck.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Mechanical Fasteners.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

2.3 NONCOMPOSITE FORM DECK

A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 80 (550) minimum, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.

    a. Color: Manufacturer's standard.

2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80 (550), G60 (Z180) zinc coating.

3. Profile Depth: 9/16 inch.

4. Design Uncoated-Steel Thickness: As indicated.

5. Span Condition: Triple span or more.

6. Side Laps: Overlapped.

2.4 NONCOMPOSITE FORM DECK

A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 80 (550), G60 (Z180) zinc coating.

2. Profile Depth: 9/16 inch.

3. Design Uncoated-Steel Thickness: As indicated.

4. Span Condition: Triple span or more.

5. Side Laps: Overlapped.

2.5 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

E. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck. For drains, cut holes in the field.

I. Galvanizing Repair Paint: ASTM A 780.

J. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Locate deck bundles to prevent overloading of supporting members.

C. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

D. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

G. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1 inches (25 mm), with end joints as follows:

1. End Joints: Lapped 2 inches (51 mm) minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches (305 mm) apart with at least one fastener at each corner.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 FLOOR-DECK INSTALLATION

A. Fasten floor-deck panels to steel supporting members as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1 inche (25 mm), with end joints as follows:

1. End Joints: Lapped.

D. Pour Stops and Girder Fillers: Fasten steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.

E. Floor-Deck Closures: Fasten steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Inspections: Refer to Section 01 4500 “Special Inspections and Tests” for required verifications and inspections.

C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

D. Remove and replace work that does not comply with specified requirements.

E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Floor joist framing.
3. Roof rafter framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for masonry shelf angles and connections.
2. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cold-formed steel framing product and accessory.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each listed product, for tests performed by manufacturer.
1. Expansion anchors.
2. Power-actuated anchors.
3. Mechanical fasteners.
4. Vertical deflection clips.
5. Horizontal drift deflection clips
6. Miscellaneous structural clips and accessories.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

B. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

B. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

2.2 COLD-FORMED STEEL FRAMING, GENERAL

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: ST33H (ST230H) and ST50H (ST340H) as indiacted.

2. Coating: G60 (Z180).

B. Steel Sheet for Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 33 (230) and 50 (340), Class 1.
2. Coating: G60 (Z180).

2.3 LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2. Flange Width: 1-5/8 inches (41 mm).

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
2. Flange Width: 1-1/4 inches (32 mm).

C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2. Flange Width: 1-5/8 inches.

2.4 FLOOR JOIST FRAMING

A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, unpunched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2. Flange Width: 1-5/8 inches (41 mm), minimum.

B. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2. Flange Width: 1-1/4 inches (32 mm), minimum.

2.5 ROOF-RAFTER FRAMING

A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2. Flange Width: 1-5/8 inches (41 mm), minimum.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.

3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by mechanically deposition according to ASTM B 695, Class 50.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.

C. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 LOAD-BEARING WALL INSTALLATION

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:

1. Anchor Spacing: To match stud spacing.

B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:

1. Stud Spacing: As indicated.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.

D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.

E. Align floor and roof framing over studs according to AISI S200, Section C1. Where framing cannot be aligned, continuously reinforce track to transfer loads.

F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.

H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.

1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.

I. Install horizontal bridging in stud system, spaced vertically 48 inches (1220 mm). Fasten at each stud intersection.

1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches (150 mm) deep.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.

K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 JOIST INSTALLATION

A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:

1. Joist Spacing: As indicated.

D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.

E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.

1. Install web stiffeners to transfer axial loads of walls above.

F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:

1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 FIELD QUALITY CONTROL

A. Remove and replace work where test results indicate that it does not comply with specified requirements.

B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

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SECTION 054400

COLD-FORMED METAL TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Cold-formed steel trusses for roofs.
2. Cold-formed steel trusses for floors.

B. Related Requirements:

1. Section 054000 "Cold-Formed Metal Framing" for cold-formed steel studs, joists, and rafters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel trusses; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel trusses.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each listed product, for tests performed by manufacturer.
1. Expansion anchors.
2. Power-actuated anchors.
3. Mechanical fasteners.
4. Miscellaneous structural clips and accessories.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect cold-formed steel trusses from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel trusses capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated.
2. Deflection Limits: Design trusses to withstand design loads without deflections greater than the following:

    a. Floor Trusses: Vertical deflection of 1/480 for live loads and l/240 for total loads of the span.
    b. Roof Trusses: Vertical deflection of 1/360 for live loads and l/240 for total loads of the span.

C. Cold-Formed Steel Framing Design Standards:

1. Floor and Roof Systems: Design according to AISI S210.
2. Roof Trusses: Design according to AISI S214.

2.2 COLD-FORMED STEEL TRUSS MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of grade and coating weight as follows:

1. Grade: As required by structural performance.

2. Coating: G60 (Z180).

2.3 ROOF TRUSSES

A. Roof Truss Members: Manufacturer's standard C-shaped steel sections.
1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2.4 FLOOR TRUSSES

A. Floor Truss Members: Manufacturer's standard C-shaped steel sections.

1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).

2.5 ACCESSORIES

A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, structural grade, Type H, metallic coated, of same grade and coating weight used for truss members.

B. Provide accessories of manufacturer's standard thickness and configuration unless otherwise indicated.

2.6 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Power-Actuated Fasteners: Fastener system of type suitable for application, fabricated from corrosion-resistant materials, with capability to sustain, without failure, allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

D. Welding Electrodes: Comply with AWS standards.

2.7 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780.

B. Shims: Load bearing, of high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

2.8 FABRICATION

A. Fabricate cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate trusses using jigs or templates.
2. Cut truss members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel truss members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

4. Fasten other materials to cold-formed steel trusses by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace trusses to withstand handling, delivery, and erection stresses. Lift fabricated trusses to prevent damage or permanent distortion.

C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates and abutting cold-formed steel trusses 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. Install, bridge, and brace cold-formed steel trusses according to AISI S200, AISI S214, AISI's "Code of Standard Practice for Cold-Formed Steel Structural Framing," and manufacturer's written instructions unless more stringent requirements are indicated.

B. Install cold-formed steel trusses and accessories plumb, square, and true to line, and with connections securely fastened.

1. Fasten cold-formed steel trusses by welding or mechanical fasteners.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners and install according to Shop Drawings; comply with requirements for spacing, edge distances, and screw penetration.

C. Install temporary bracing and supports. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

D. Truss Spacing: As indicated.

E. Do not alter, cut, or remove framing members or connections of trusses.

F. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.

G. Erect trusses without damaging framing members or connections.

H. Coordinate with wall framing to align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.

I. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to CFSEI's TechNote 551e, "Design Guide: Permanent Bracing of Cold-Formed Steel Trusses."

J. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

1. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 FIELD QUALITY CONTROL

A. Field and shop welds will be subject to testing and inspecting.

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal trusses are without damage or deterioration at time of Substantial Completion.

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SECTION 05 5010

METAL BOLLARDS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Metal bollards filled with concrete.
   2. Metal bollard with push plate.

B. Products furnished, but not installed, under this Section include the following:
   1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete.
   2. Steel weld plates and angles for casting into concrete.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Metal bollards.

B. Shop Drawings: Show fabrication and installation details. Include plans, and details of metal fabrications and their connections. Show anchorage and accessory items.

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 A36/A36M.

C. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.2 MISCELLANEOUS MATERIALS

A. Primer: As specified in Section 099600 High Performance Coatings.

B. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

C. Cover: 1/4-inch-thick, heavy duty yellow plastic bollard cover with 2 red reflective tape stripes.

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

D. 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.

E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches from ends and corners of units and 24 inches o.c.

2.4 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.
   1. Cap bollards with 1/4-inch-thick steel.

2.5 SQUARE METAL BOLLARDS WITH PUSH PLATE

A. Basis of Design: CareProdx: Stainless Steel Bollard with Push Plate.
   1. Metal bollards with 4-1/2" Square 635 push plate.
   2. Transmitter: Direct Wired.
   3. Cap: Stainless Steel Welded Flat Cap with 1/4-inch-thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
   4. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.6 GENERAL FINISH REQUIREMENTS

A. Finish metal fabrications after assembly.

2.7 STEEL AND IRON FINISHES

A. Galvanizing: Hot dip galvanizes items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 EXECUTION

3.1 INSTALLATION OF METAL BOLLARDS

A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

B. Anchor bollards in concrete in formed or core-drilled holes not less than 42 inches deep and 3/4-inch larger than OD of bollard. Fill annular space around bollard solidly with shrinkage-resistant grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.

C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

D. Fill bollards solidly with concrete, mounding top surface to shed water.

3.2 REPAIRS

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

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SECTION 05 5100

METAL STAIRS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Preassembled steel stairs with concrete-filled treads.
   2. Industrial-type, straight-run stairs with steel-grating treads and railings.

B. See Division 05 Section "Pipe and Tube Railings" for pipe and tube railings.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance of Stairs: Provide metal stairs capable of withstanding effects of gravity loads and following loads and stresses within limits and under conditions indicated:
   1. Uniform Load: 100 lbf/sq. ft.
   2. Concentrated Load: 300 lbf applied to an area of 4 sq. in.
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
   5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.

1.3 SUBMITTALS

A. Product Data: For metal stairs.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. Include structural analysis data signed and sealed by qualified professional engineer responsible for preparation.

1.4 COORDINATION

A. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

B. Coordinate locations of hanger rods and struts with other work so they will not encroach on required stair width and will be within fire-resistance-rated stair enclosure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers:
   1. Alfab, Inc.
   2. American Stair, Inc.
   3. Sharon Companies Ltd. (The).

4. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes. For components exposed to view in 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.

C. Steel Tubing: ASTM A 500 (cold formed), Grade B.

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.

F. Wire Rod for Grating Crossbars: ASTM A 510.

G. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, Grade 25.

H. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, Grade 30.

2.3 MISCELLANEOUS MATERIALS

A. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

B. Fasteners: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for exterior use, and Class Fe/Zn 5 where built into exterior walls.

C. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

E. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for stairs indicated to be galvanized and stairs indicated to be shop primed with zinc-rich primer.

F. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by qualified independent testing agency.

G. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

H. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

I. Welded Wire Fabric: ASTM A 185, 6 by 6 inches-W1.4 by W1.4, unless otherwise indicated.

J. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

2.4 FABRICATION

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding, unless otherwise indicated. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercutting or overlapping. Remove welding flux immediately. At exposed connections, finish exposed welds smooth and blended.
   2. Use connections that maintain structural value of joined pieces.
   3. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
   4. Form bent-metal corners to smallest radius possible without impairing work.
   5. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

B. Stair Framing: Fabricate stringers of steel channels. Construct platforms of steel channel headers and miscellaneous framing members. See structural drawings for sizes.
   1. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
   2. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

C. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.0677 inch.
   1. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal stairs after assembly.

B. Provide Galvalume AZ50 finish. Comply with ASTM A 792.

C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed products:
   1. Interior Stairs (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

E. Apply shop primer to uncoated surfaces of metal stair components. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for

shop painting.

PART 3 EXECUTION

3.1 INSTALLATION

A. Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete, unless otherwise indicated.

C. Fit exposed connections accurately together to form hairline joints. Weld connections not left as exposed joints. Do not weld, cut, or abrade surfaces of exterior units that have been hot dip galvanized after fabrication and for bolted or screwed field connections.

D. Grind all welds to be smooth, uniform, clean and of architectural grade appearance to meet NOMMA Finish #2.

E. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete".

F. Adjusting and Cleaning:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting.
   2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 05 5115

METAL LADDERS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Metal ships' ladders.
   2. Miscellaneous framing and supports.

1.2 SUBMITTALS

A. Product Data: For the following:
   1. Nonslip aggregates and nonslip-aggregate surface finishes for steel treads.
   2. Fasteners.
   3. Shop primers.
   4. Metal ships' ladders.

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. Miscellaneous framing and supports for applications where framing and supports are not specified in other Sections.
   2. Metal ships' ladders.

1.3 FIELD CONDITIONS

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

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance of Ladders, including landings, are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI/ASC A14.3.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

B. Ferrous Metals:
   1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   2. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 or 316L.
   3. Steel Tubing: ASTM A 500, cold-formed steel tubing.
   4. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
   5. Slotted Channel Framing: Cold-formed metal channels complying with MFMA-3, 1-5/8 by 1-5/8 inches. Channels made from structural steel, Grade 33, with galvalume coating;

0.079-inch nominal thickness.

C. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface.
   1. Source Limitations: Obtain floor plate from single source from single manufacturer.

2.3 FASTENERS

A. General: Select fasteners for type, grade, and class required.

2.4 MISCELLANEOUS MATERIALS

A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79.

B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
   1. Available Products:
      a. Benjamin Moore & Co.; Epoxy Zinc-Rich Primer CM18/19.
      b. Carboline Company; Carbozinc 621.
      c. ICI Devoe Coatings; Catha-Coat 313.
      d. International Coatings Limited; Interzinc 315 Epoxy Zinc-Rich Primer.
      e. PPG Architectural Finishes, Inc.; Aquapon Zinc-Rich Primer 97-670.
      f. Sherwin-Williams Company (The); Corothane I GalvaPac Zinc Primer.
      g. Tnemec Company, Inc.; Tneme-Zinc 90-97.
      h. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

C. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.

D. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

2.5 FABRICATION

A. General: Preassemble items in shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
   1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
   2. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercutting or overlapping. Remove welding flux immediately. Finish exposed welds smooth and blended.
   3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
   4. Where units are indicated to be cast into concrete or built into masonry, equipped with integrally welded steel strap anchors, not less than 24 inches o.c.

B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.

C. Metal Ladders: Comply with ANSI A14.3, unless otherwise indicated.
   1. Space siderails 18 inches apart, unless otherwise indicated.
   2. Steel Ladder Construction: Flat bar siderails, with 3/4-inch-diameter steel bar rungs fitted in centerline of siderails, plug-welded, and ground smooth on outer rail faces.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal fabrications after assembly.

B. Steel and Iron Finishes:
   1. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces with galvalume coating to comply with requirements indicated below for environmental exposure conditions of installed metal fabrications:
      a. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
   2. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.
   1. Fit exposed connections accurately together. Weld connections that are not to be left as exposed joints but cannot be shop welded.
   2. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
   3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

B. Grind all welds to be smooth, uniform, clean and of architectural grade appearance to meet NOMMA Finish #2.

C. Touch up surfaces and finishes after erection.
   1. Painted Surfaces: Clean field welds, bolted connections, and abraded areas and touch up paint with the same material as used for shop painting.

END OF SECTION

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SECTION 05 5213

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Steel pipe and tube railings.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails:
      a. Uniform load of 50 lbf/ ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. applied in any direction.
      b. Concentrated load of 200 lbf applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   3. Infill of Guards:
      a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
      b. Uniform load of 25 lbf/sq. ft. applied horizontally.
      c. Infill load and other loads need not be assumed to act concurrently.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.3 SUBMITTALS

A. Product Data: For grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Steel Pipe Railings:
      a. Pisor Industries, Inc.

b. Sharpe Products.
c. Wagner, R & B, Inc.; a division of the Wagner Companies.
d. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Source Limitations: Obtain each type of railing from single source from single manufacturer.

2.2 METALS

A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

B. Steel and Iron:
1. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
2. Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Castings: Either gray or malleable iron, unless otherwise indicated.
a. Gray Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
b. Malleable Iron: ASTM A 47/A 47M.

2.3 HANDRAIL BRACKETS FOR RAILINGS

A. Handrail brackets for steel railings: Furnish and install standard handrail brackets as provided by one of the following manufacturers. Basis of design Wagner RB14030:
1. Inline Design.
2. Pisor Industries, Inc.
3. Sharpe Products.
4. Wagner, R & B, Inc.
5. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Provide concealed fasteners, unless unavoidable or standard for railings indicated.
1. Steel Railings: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.

B. Anchors: Provide chemical or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, load equal to six times load imposed when installed in unit masonry and equal to four times load imposed when installed in concrete, as determined by testing per ASTM E 488.

C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

D. Shop Primers: Provide primers that comply with Division 09 Section “Painting and Coating”.

E. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.

F. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

G. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer compatible with finish paint systems indicated and complying with SSPC-Paint 5.

H. Grout and Anchoring Cement: Factory-packaged, non-shrink, nonmetallic grout complying with ASTM C 1107; or water-resistant, non-shrink anchoring cement; recommended by manufacturer for exterior use.

2.5 FABRICATION

A. General: Fabricate railings to comply with design, dimensions, and details indicated, but not less than required to support structural loads.

B. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

C. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings.

D. Form changes in direction by bending or by inserting prefabricated elbow fittings.

E. Form curves by bending in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.

F. Close exposed ends of railing members with prefabricated end fittings.

G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.

2.6 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces accepted if within one-half of range of approved samples. Noticeable variations in same piece not accepted. Variations in appearance of other components accepted if within range of approved samples and assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 STEEL AND IRON FINISHES

A. Steel and Iron:
   1. Shop-Primed Galvanized Railings: After galvanizing, clean railings, treat with metallic-phosphate process, and apply primer to comply with SSPC-PA 1.

PART 3 EXECUTION

3.1 GENERAL

A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
   1. Set posts plumb within a tolerance of 1/16-inch in 3 feet.
   2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4-inch in 12 feet.

B. Locations: Provide at locations indicated on drawings, and at the following locations:
   1. Provide handrails at all stairs, each side of stair.
   2. Provide handrails at all ramps with a rise greater than 6 inch.

C. Install handrail at height of 34 inches - 38 inches above ramp surface or stair tread nosings, measured from ramp surface or tread nosing to top of handrail.

D. All handrails to return to adjacent wall, guardrail or other surface. If not specifically shown on drawings, manufacturer to verify where handrails return with Architect prior to fabrication.

E. Ensure 1-1/2 inch minimum clearance between inside face of handrail and nearest adjacent surface including, but not limited to, wall or guardrail support post.

F. Welding of components:
   1. Continuously weld all guardrail components on all exposed edges and at non-exposed areas needed to meet or exceed structural requirements.
   2. Grind all welds to be smooth, uniform, clean and of architectural grade appearance to meet NOMMA Finish #1.
      a. Bondo and skim-coat all exposed metal surfaces as needed to provide specified appearance and finish prior to painting.
      b. Architect will provide final approval of welded and dressed connections prior to painting.

G. Fill all scratches, scuffs, mars, etc. in exposed surfaces of guardrail components with body putty and sanded smooth prior to painting.

H. Anchor posts in concrete by inserting into formed or core-drilled holes and grouting annular space.

I. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.

J. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

K. Anchor railing ends to concrete and masonry with round flanges connected to railing ends and anchored to wall construction with anchors and bolts.

L. Secure wall brackets to building construction as indicated, or if not indicated, as follows:
   1. Provide blocking between studs in stud wall construction, if applicable.

M. Adjusting and Cleaning:
   1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting.
   2. Clean all guardrail components prior to and after painting.

3.2 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion. It is contractor's responsibility to correct, either by repairing or replacing, any and all damage sustained to railings during construction.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

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SECTION 05 7313

DECORATIVE GLASS RAILINGS

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Fabricate and install pre-engineered, component-based, ornamental railing system in accordance with the requirements set forth in this section.

1.2 STRUCTURAL REQUIREMENTS

A. Railing assembly to withstand minimum concentrated load of 200 pounds applied vertically downward or horizontally in any direction, but not simultaneously, at any point on top rail.

B. Railing assembly to withstand minimum uniform load of 50 pounds per foot applied horizontally or vertically downward, but not simultaneously, on top rail. Do not apply uniform loads concurrently with concentrated loads.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements.
   1. Components and installation to be in accordance with state and local code authorities.
   2. Components and installation to follow current International Building Code (IBC), Americans with Disabilities Act (ADA) and ICC/ANSI A117.1 guidelines.

1.4 SUBMITTALS

A. Submit product data under provisions of Division 00 & 01 Specifications, including description of materials, components, fabrication, finishes.
   1. Submit manufacturer’s shop drawings, including plans, elevations, sections, and details, indicating materials, components, sizes, dimensions, tolerances, hardware, fasteners, finishes, options, accessories, and installation. Show details of attaching railing system to supports. Submit one set of PDF files for approval.

B. Submit manufacturer’s samples of standard materials, finishes, colors, and textures.

C. Submit mockup: Full size in place mockup complete with two posts, glass, and full-size hardware.

D. Test Reports: Submit test reports indicating compliance with ASTM E985.

E. Manufacturers Quality Assurance: Submit manufacturer’s certification that materials comply with specified requirements and are suitable for intended application.

F. Certificates:
   1. Furnish manufacturer's certification that materials meet specification requirements.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Instructions: Manufacturer's maintenance and cleaning instructions.

B. Warranty: Manufacturer's standard warranty from date of Substantial Completion.
   1. Warranty shall be clearly noted or highlighted.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.

B. Storage on site:
   1. Store material in location and manner to avoid damage. Stack properly to prevent bending.
   2. Store material in a clean, dry location away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting to permit circulation of air inside covering.
   3. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of material.

PART 2 PRODUCTS

2.1 RAILING SYSTEM

A. Basis of Design: STRUCT-U-RAIL as manufactured by LIVERS BRONZE CO. Phone: (816) 300-2828. Fax: (816) 300-0864. Web site: www.liversbronze.com. Local Representative: Tim Finley Phone: (507) 676-2561.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 MATERIALS AND FINISHES

A. Stainless Steel: Type 304.
   1. Finish: #4 Brushed Directional.

B. U-Channel Support Base:
   1. Manufacturer's standard U-shape profile base as shown on drawings.

C. Glass:
   1. Thickness: 1/2-inch.
   2. Material: Laminated glass, ASTM C 1172.
   3. Tint: None.

D. Handrails and Handrail brackets:
   1. Manufacturer's standard U-shape profile base as shown on drawings.
   2. Material: Stainless steel, Type 304.

2.3 FABRICATION

A. All metal fabrication to be performed by a single source fabricator.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with shop drawings and manufacturer's instructions at locations indicated on drawings.

B. Erect work square and level to floor surfaces, parallel and plumb to stair stringers, rigid, and free from distortion or defects detrimental to appearance or performance.

C. Provide expansion joints as needed to allow for thermal expansion or contraction.

3.2 CLEANING

A. As installation is completed, wash thoroughly using clean water and soap, rinse with clean water.

B. Do not use acid solution, steel wool or other harsh abrasives.

3.3 REPAIR OF DEFECTIVE WORK

A. Remove stained or otherwise defective work and replace with material that meets specification requirements.

B. Repair damaged finish as directed by Architect.

C. Replace defective or damaged components as directed by Architect.

END OF SECTION

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SECTION 05 7501

METAL CANOPIES

PART 1 GENERAL

1.1 SUMMARY

A. This section includes Metal Canopies.

B. Related Items and Considerations.
1. Flashing of various designs if required.
2. Determine wall construction, make-up, and thickness.
3. Ensure adequate wall condition to carry canopy loads where required.
4. Consider water drainage away from canopy where necessary.
5. Any necessary removal or relocation of existing structures, obstructions, or materials.

1.2 SUBMITTALS

A. Shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly. Confirm dimensions prior to preparation of shop drawings.

B. Manufacturer’s standard literature and specifications for canopies.

1.3 PERFORMANCE REQUIREMENTS

A. Canopy to conform to local building codes.

B. Determine if specific load requirements have been established for canopies and if stamped calculations are required for location in which canopy is installed.

1.4 DELIVERY, STORAGE, HANDLING

A. Deliver and store all canopy components in protected areas.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Basis of Design: Mapes Architectural Canopies.
1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 MATERIALS

A. Super Lumideck.
1. Fascia Material: Extruded aluminum, alloy T6 - 6063. Thickness: 0.125-inch.
2. Fascia Options: 8" J.
3. Deck Options: 2-3/1" Corrugated.
4. Projection/Post: Hanger Rod Supports (max 10').
5. Concealed drainage: Drain water from covered surfaces into integral fascia gutter and

directed to either front for front drainage or to rear for ground level discharge via one or more designated downspouts.

6. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 FINISHES

A. Standard Factory Options: Standard two-coat Kynar® colors.

2.4 FABRICATION

A. All connections: Mechanically assembled using 3/16-inch fasteners with minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not accepted.

B. Decking: Design with interlocking extruded aluminum members with mechanical fasteners field applied to provide structural integrity for completed assembly.

PART 3 EXECUTION

3.1 INSPECTION

A. Confirm the surrounding area is ready for the canopy installation.

B. Installer: Confirm dimensions and elevations as shown on drawings provided by Canopy Manufacturer.

C. Erection: Performed by installer and scheduled after all concrete, masonry and roofing in work area is completed.

3.2 INSTALLATION

A. Install in strict accordance with manufacturer’s shop drawings. Give particular attention to protecting the finish during handling and erection.

3.3 CLEANING

A. After installation, leave the entire system in clean condition.

END OF SECTION

SECTION 06 1053

MISCELLANEOUS ROUGH CARPENTRY

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Wood blocking.
   2. Wood nailers.
   3. Plywood backing panels.

1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.
   1. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
   1. Power-driven fasteners.

PART 2 PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber compliant with applicable rules of any rules-writing agency certified by ALSC Board of Review. Provide lumber graded by an agency certified by ALSC Board of Review to inspect and grade lumber under rules indicated.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber indicated to receive stained or natural finish, mark grade stamp on end or back of each piece.
   3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 19 percent.

B. Other Framing: No. 2 grade and any of following species:
   1. Hem-fir (north); NLGA.
   2. Southern pine; SPIB.
   3. Douglas fir-larch; WCLIB or WWPA.
   4. Mixed southern pine; SPIB.
   5. Spruce-pine-fir; NLGA.
   6. Douglas fir-south; WWPA.
   7. Hem-fir; WCLIB or WWPA.
   8. Douglas fir-larch (north); NLGA.
   9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.3 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including following:
   1. Blocking.
   2. Nailers.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.

C. For exposed boards, provide lumber with 19 percent maximum moisture content of eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.

D. Wood blocking under fully adhered membranes: Untreated Douglas Fir No. 2. Protect blocking with poly cover prior to membrane installation. Blocking must be within allowed moisture content.

E. For concealed boards, provide lumber with 19 percent maximum moisture content and any of following species and grades:
   1. Mixed southern pine, No. 2 grade; SPIB.
   2. Eastern softwoods, No. 2 Common grade; NELMA.
   3. Northern species, No. 2 Common grade; NLGA.
   4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.

2.4 PLYWOOD BACKING PANELS

A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.5 FASTENERS

A. General: Where rough carpentry is exposed to weather, in ground contact, in area of high relative humidity, or preservative treated, provide fasteners with hot-dip zinc coating complying with ASTM A 153 Class D.

B. Power-Driven Fasteners: NES NER-272.

C. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Do not splice structural members between supports, unless otherwise indicated.

C. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

D. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
   3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
   4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
   5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
   6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
   7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

3.2 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.

END OF SECTION

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SECTION 06 1600

SHEATHING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Wall sheathing.

1.2 SUBMITTALS

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

1.3 DELIVERY, STORAGE, AND HANDLING

A. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.1 WALL SHEATHING

A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
   1. Type and Thickness: Regular, 5/8 inch thick.
   2. Products:
      a. Dens Gold by G-P Gypsum.
      b. GlasRoc by CertainTeed.
      c. Securock by USG.
      d. E2EXP Extended Exposure Sheathing by National Gypsum.
      e. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 FASTENERS

A. General: Provide fasteners of size and type indicated.
   1. For wall sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Securely attach to substrate by fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
   3. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
   4. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."

B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials

are installed in sequence and manner that exclude exterior moisture.

C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.
   1. Fasten gypsum sheathing to wood framing with nails or screws.
   2. Fasten gypsum sheathing to cold-formed metal framing with screws.
   3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
   4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Seal sheathing joints according to sheathing manufacturer's written instructions.
   1. Apply 'fire tape' joints to all sheathing joints to protect the foam plastic insulation that will be applied outside the gyp sheathing. Seal other penetrations and openings with 30 min sealant joints to protect foam plastic.

3.4 PROTECTION

A. Apply covering immediately after sheathing is installed.

END OF SECTION

SECTION 06 1613

INSULATING SHEATHING SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

A. The Section includes insulating wall sheathing with integral water-resistive barrier and air barrier.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of sheathing product specified. Include evaluation reports from ICC-ES for wood sheathing and seam tape, and product certifications indicating that sheathing products comply with ICC-ES AC269 and ICC-ES AC310.

1.3 CLOSEOUT SUBMITTALS

A. Special Manufacturer's Warranty: Manufacturer's standard form in which sheathing manufacturer agrees to repair or replace sheathing products that demonstrate deterioration or failure under normal use due to manufacturing defects within warranty period specified, when installed according to manufacturer's instructions.
   1. Warranty Period for Sheathing Products: 30 years following date of Substantial Completion.
   2. Warranty Conditions: Special warranties exclude deterioration or failure due to structural movement resulting in stresses on sheathing products exceeding manufacturer's written specifications, or due to air or moisture infiltration resulting from cladding failure or mechanical damage.
   3. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

A. Provide wall sheathing products meeting requirements for water-resistive barrier in accordance with ICC-ES AC310.

B. Provide wall sheathing products meeting requirements of ICC-ES AC269.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's written instructions for protection of sheathing products from weather prior to installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Huber Engineered Woods LLC, Charlotte NC; Phone: (800) 933-9220; Website: www.zipsystem.com.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Assembly Air Leakage: Less than 0.04 cfm/sq. ft. at 1.57 lbf/sq. ft.

B. Water-Vapor Permeance, Facer: Minimum 12 perms, ASTM E96/E96M.

C. Weather Exposure: Manufacturer warranty applies for maximum allowable exposure period of 180 days.

2.3 MATERIALS

A. Oriented Strand Board: DOC PS 2, made with binder containing no added urea formaldehyde.

B. Rigid Foam Plastic Insulating Board: Rigid polyisocyanurate foam core complying with ASTM C1289 Type II, Class 2, and ICC-ES AC12, with coated glass fiber facers on both sides and the following characteristics:
   1. Nominal Density: 2.0 pcf.
   2. Compressive Strength, ASTM D1621: Not less than 20 psi.
   3. Vapor Permeance, ASTM E96/E96M: Less than 1.0 perm.
   4. Edge Configuration: Square finished.

2.4 INSULATING WALL SHEATHING

A. Composite Insulating Wall Sheathing: Oriented-strand-board Exposure 1 sheathing 7/16-inch thick, factory-laminated water-resistive barrier exterior facer, and rigid foam plastic insulating board laminated to interior face.
   1. Basis-of-Design Product: Huber Engineered Woods LLC; ZIP System R-6 Sheathing.
   2. Span Rating and Performance Category of Sheathing Layer: Not less than 24/16; 7/16 Performance Category.
   3. Panel thickness: 2 inches.
   4. Thermal Resistivity (R Value): R- 9.
   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 inches and 24 inches on center spacing and the following characteristics.
      a. Water Resistance of Coatings, ASTM D2247: Pass 14-day exposure test.
      b. Moisture Vapor Transmission, ASTM E96: Not less than 12 perms.
      c. Water Penetration, ASTM E331: Pass at 2.86 lbf/sq. ft.
      d. Wind Driven Rain, TAS-100: Pass.
      e. Accelerated Weathering, ASTM G154: Pass.
   7. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.5 FASTENERS

A. Fasteners, General: Size and type complying with manufacturer's written instructions for Project conditions and requirements of authorities having jurisdiction.
   1. Corrosion Resistance: Hot-dip zinc coating, ASTM A153/A 153M or Type 304 stainless steel.

B. Nails, Brads, and Staples: ICC AC116 and ICC AC201.

C. Power-Driven Fasteners: ICC-ES-1539 or NER-272.

D. Wood Screws: ASME B18.6.1.

2.6 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIAL

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

B. Liquid-Applied Flashing: Seamless air and water barrier.
   1. Basis of Design: Zip System “Liquid Flash”.
   2. Thickness: 12-15 mil minimum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine framing spacing and alignment to determine if work is ready to receive sheathing. Proceed with sheathing work once conditions meet requirements.

3.2 SHEATHING INSTALLATION

A. Install sheathing panels in accordance with manufacturer's written instructions, requirements of applicable Evaluation Reports, and requirements of authorities having jurisdiction.

B. Air and Moisture Barrier: Coordinate sheathing installation with flashing and joint sealant installation and adjacent building air and moisture barrier components to provide complete, continuous air- and moisture- barrier.

C. Do not bridge expansion joints; allow joint spacing equal to spacing of structural supports.

D. Install panels with laminated facer to exterior. Stagger end joints of adjacent panel runs.

E. Attach sheathing panels securely to substrate with manufacturer-approved fasteners in compliance with the following:
   1. ICC-ES ESR-1539 or ICC-NES NER-272 for power-driven fasteners.
   2. IBC: Table 2304.9.1 Fastening Schedule.

F. Apply seam tape at all panel seams, penetrations, and facer defects or cracks to form continuous weathertight surface. Apply tape according to manufacturer's written instructions and requirements of ICC-ES applicable to tape application.

G. Apply liquid flashing in strict accordance with manufacturer's written instructions.

END OF SECTION

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SECTION 06 4023

INTERIOR ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Plastic-laminate cabinets.
   2. Plastic-laminate countertops.
   3. Solid-surfacing-material countertops.
   4. Solid-surfacing-material windowsills.

B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated including solid-surfacing material, cabinet hardware and accessories, handrail brackets and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.3 QUALITY ASSURANCE

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards".

1.4 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork 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 woodwork is 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 woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.
   2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 PRODUCTS

2.1 MATERIALS

A. Wood Products:
   1. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
   2. Particleboard: ANSI A208.1, Grade M-2.

B. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

D. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
   1. See Finish Schedule for Manufacturers, Products, Patterns, and Colors.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

E. Quartz Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
   1. See Finish Schedule for Manufacturers, Products, Patterns, and Colors.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use Exterior Type or Interior Type A. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment.

B. Fire-Retardant Particleboard: Panels made from softwood particles and fire-retardant chemicals mixed at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.

C. Fire-Retardant Fiberboard: ANSI A208.2 medium-density fiberboard panels made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed at time of panel manufacture with flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

D. Provide Fire-retardant materials only where required to maintain code compliance.

2.3 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)".

B. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 170 degrees of

opening, institutional quality. 1-1/2 pair for doors 20-40 lbs or 3 feet -5 feet high. 2 pair for doors 40-60 lbs or 5 feet -7 feet high, manufactured by Grass America Inc. SOFT CLOSE REQUIRED AT ALL DOORS.

D. Back-Mounted Pulls: BHMA A156.9, B02011.
   1. Manufacturer: Hafele - Wire Pull.
      a. Overall Dimension: 4 inches.
      b. Finish: Brushed Stainless Steel.

E. Catches: Magnetic catches, BHMA A156.9, B03141.

F. Drawer Slides: BHMA A156.9, B05091. SOFE CLOSE REQUIRED AT ALL DOORS.
   1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted; full-extension type; zinc-plated steel with polymer rollers. 75-pound capacity for drawers less than 18 inches wide.
      a. Accuride #3800.
      b. Knape & Vogt #8300.
      c. Fulterer FR5045.
   2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides. 100-pound capacity for drawers 18 inches or wider.
      a. Accuride #4037.
      b. Knape & Vogt #8500.
      c. Fulterer FR5210.
   3. Box Drawer Slides: Grade 1; for drawers not more than 6 inches high and 24 inches wide.
   4. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches high or 24 inches wide.

G. Aluminum Channels for Glass Panels: BHMA A156.9, B07063.
   1. CRL Aluminum Channel.
      a. 1/2" x 1" High Wall.
      b. 1/2" Laminated glazing, see glazing spec.
      c. Satin Anodized.

H. Speak-Thru: CRL Brushed Stainless Steel 5" Speak-Thru.

I. Tray: CRL Brushed Stainless Steel 16" Wide x 10" Deep x 1-9/16" High standard drop-in deal tray.

J. Grommets:
   1. 2-1/2 inch diameter, white plastic. Provided by millwork vendor, contractor installed.
      a. Provide at all counters with knee space below. Coordinate locations with owner. Install (1) every 5 feet of open counter.

K. Door Locks: BHMA A156.11, E07121. Where indicated equivalent to CompX Timberline Removable Lock Plug System.
   1. Finish: Satin Nickel

L. Drawer Locks: BHMA A156.11, E07041. Where indicated equivalent to CompX Timberline Drawer Lock Series 280.
   1. Finish: Satin Nickel

M. Restrictor: Provide on all hinged doors adjacent to cabinets or countertops of greater depth, or adjacent to walls. Restrictor to stop contact between door and door pull and any adjacent surfaces.
   1. Product: Rocker, Blum Restrictor Clip or equivalent. (for restrictor)

N. Shelf Rests (for drilled holes): Steel with satin chrome finish.
   1. Shelf pins = bright chrome for 1/4-inch hole.

O. Neoprene door/drawer bumpers: ANSI A156.16, L03021, color black or clear transparent. Provide at each door/drawer condition.

P. Knee braces a.k.a. countertop supports:
   1. Bracket = Hafele “Hebgo” bracket.
      a. At 30-inches-deep counter tops = provide Hafele 287.45.486 - 28 inches brackets.
      b. At 25-inches-deep counter tops = Hafele 287.45.477 - 23 inches brackets.
   2. Finish = Paint to match wall.
   3. Provide all countertops with knee space below, at 32 inches o.c. typical.

Q. Hat and Coat hooks: Peter Pepper 2071, anodized aluminum.
   1. Provide at the following locations: Restrooms 102, 103, 135, 136, 232, 233, 234, and 235.

R. Exposed Hardware Finishes: For exposed hardware, provide a finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
   2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
   3. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
   4. Satin Stainless Steel: BHMA 630.

2.4 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, fire-retardant-treated, kiln-dried to less than 15 percent moisture content.

2.5 FABRICATION

A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
   1. Interior Woodwork Grade: Custom.
   2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.
   3. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual". For glass in wood frames, secure glass with removable stops.

B. Plastic-Laminate Cabinets:
   1. AWI Type of Cabinet Construction: Flush overlay.
   2. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:
      a. Horizontal Surfaces Other Than Tops: Grade HGS.
      b. Postformed Surfaces: Grade HGP.
      c. Vertical Surfaces: Grade VGS.

d. Edges: PVC edge banding, 0.5 mm thick, matching laminate in color, pattern, and finish.

3. Materials for Semi-exposed Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
4. Drawer Sides and Backs: Solid-hardwood lumber.
5. Drawer Bottoms: Hardwood plywood.
6. Colors, Patterns, and Finishes: See Finish Schedule.
   a. For wood grain laminates, provide vertical grain on drawers unless otherwise noted on drawings.

C. Plastic-Laminate Countertops:
1. High-Pressure Decorative Laminate Grade: HGS.
2. Colors, Patterns, and Finishes: See Finish Schedule.
3. Edge Treatment: Same as laminate cladding on horizontal surfaces or as indicated.

D. Solid-Surfacing-Material Countertops:
1. Solid-Surfacing-Material Thickness: 1/2-inch.
2. Colors, Patterns, and Finishes: See Finish Schedule.
3. Fabricate tops in one piece with field-applied backsplashes. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

E. Solid-Surfacing-Material Windowsills:
1. Solid-Surfacing-Material Thickness: 1/2-inch.
2. Colors, Patterns, and Finishes: See Finish Schedule.
3. Fabricate sills in one piece. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

F. Quartz-Material Countertops:
1. Thickness: 2CM at countertops and backsplash.
2. Colors, Patterns, and Finishes: See Finish Schedule.
3. Fabricate tops in one piece with field-applied backsplashes. Comply with quartz-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.

2.6 SHOP FINISHING

A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.

PART 3 EXECUTION

3.1 INSTALLATION

A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8-inch in 96 inches. Shim

as required with concealed shims.

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

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.
   1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1 inch penetration into wood framing, blocking, or hanging strips.

G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants".

H. Windowsills: Comply with solid-surfacing-material manufacturer's written recommendations for adhesives and sealers. Caulk space between sill and window with sealant specified in Division 07 Section "Joint Sealants".

END OF SECTION

SECTION 06 6400

PLASTIC PANELING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 450 or less.

PART 2 PRODUCTS

2.1 PLASTIC SHEET PANELING

A. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Marlite FRP panels, USDA approved for incidental food contact or comparable product by one of the following:
      a. Kemlite Company Inc.
      b. Nudo Products, Inc.
      c. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.
   2. Nominal Thickness: Not less than 3/32-inch.
   3. Width: 48 inches.
   4. Height: 96 inches.
   5. Surface Finish: gently pebbled, high gloss.
   6. Color: As selected by Architect from manufacturer's full range.
   7. Location: Around mop sinks.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece PVC extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, caps and base molding as needed to conceal edges.
   1. Color: As selected by Architect from manufacturer's full range.

B. Adhesive: As recommended by plastic paneling manufacturer.

C. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint

Sealants".

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints where indicated.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive.

D. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION

SECTION 07 1326

SELF-ADHERING SHEET WATERPROOFING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Below grade modified bituminous sheet waterproofing.
   2. Molded-sheet drainage panels.

1.2 SUBMITTALS

A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.

B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.

1.3 CLOSEOUT SUBMITTALS

A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

B. Installer's Special Warranty: Covering Work of this Section, for warranty period of two years from date of Substantial Completion.
   1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.
   2. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that is approved or licensed by waterproofing manufacturer for installation of waterproofing recommended for this Project.

B. Pre-Installation Meeting: Conduct meeting at Project site.
   1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

B. Maintain adequate ventilation during preparation and application of waterproofing materials.

PART 2 PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Modified Bituminous Sheet: Not less than 60-mil- thick, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated to a 4-mil- thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
      b. Grace, W. R. & Co.; Bituthene 3000, 4000.
      c. Henry Company; Blueskin WP 200.
      d. Meadows, W. R., Inc.; SealTight Mel-Rol.
      e. Nervastral, Inc.; BITU-MEM.
      f. Polyguard Products; Polyguard 650.
      g. Tamko Roofing Products, Inc.; TW-60.
      h. Tremco TREMProof 560.
   2. Physical Properties:
      a. Tensile Strength: 250 psi minimum; ASTM D 412, Die C, modified.
      b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
      c. Low-Temperature Flexibility: Pass at minus 20°F; ASTM D 1970.
      d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
      e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
      f. Hydrostatic-Head Resistance: 150 feet minimum; ASTM D 5385.
      g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70°F; ASTM D 570.
      h. Water Vapor Permeability, ASTM E96, Method B: 0.036 perms.
      i. Resistance to Hydrostatic Head: Equivalent to 230.9 feet of water.
   3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

C. Modified Bituminous Sheet, Fabric Reinforced: 60-mil- thick, self-adhering sheet consisting of rubberized-asphalt membrane embedded in spun-bonded polyester or fiberglass nonwoven fabric reinforcement laminated to a 0.50-mil- thick polyester film with release liner on adhesive side.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Protecto Wrap Company; Jiffy Seal 140/60.
      b. Royston Laboratories, Div. of Chase Corporation; Royal-Gard Plus Membrane 104ARHT.
   2. Physical Properties:
      a. Pliability: No cracks when bent 180 degrees over 1 inch mandrel at minus 25°F;

ASTM D 146.
b. Puncture Resistance: 40 lbf minimum; ASTM E 154.
c. Water Vapor Permeance: 0.05 perms maximum; ASTM E 96/E 96M, Water Method.

2.2 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

B. Primer: Liquid primer recommended for substrate by manufacturer of sheet waterproofing material.

C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.

E. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.

F. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.

G. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.

H. Termination Bars: Approximately 1 inch by 1/8-inch-thick, predrilled at 9 inch centers.

I. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
1. Thickness: 1/8-inch, nominal, for vertical applications; 1/4-inch, nominal, elsewhere.
2. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.

J. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. minimum density, 1-inch minimum thickness.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

F. Bridge and cover isolation joints expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
   1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.2 APPLICATION

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.

B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.

D. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.

E. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.

F. Seal exposed edges of sheets at terminations not concealed by metal counter flashings or ending in reglets with mastic.

G. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.

H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

I. Install protection course with butted joints over waterproofing membrane immediately.

J. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

3.3 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
   1. For vertical applications, install protection course before installing drainage panels.

3.4 PROTECTION AND CLEANING

A. Backfill immediately, using care to avoid damaging waterproofing membrane system.

B. Do not permit foot or vehicular traffic on unprotected membrane.

C. Protect waterproofing from damage and wear during remainder of construction period.

D. Protect installed drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

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SECTION 07 2100

THERMAL INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Foam-plastic board insulation.
   2. Glass-fiber blanket insulation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include product test reports and research/evaluation reports.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

1.4 PERFORMANCE CRITERIA

A. Thermal Resistance Values (R):
   1. Thermal resistance or material thickness as shown on Drawings and scheduled herein.
   2. Indicated “R” shall be for insulation material by itself per ASHRAE.

B. Fire Hazard Classification: Insulation materials, including integral facing covers, to meet following ratings when tested in accordance with ASTM E-84 (tunnel test):
   1. Fuel contributed: 50.
   2. Maximum installed flame spread: 25.
   3. Maximum smoke developed: 450 (50 for insulation left exposed).
   4. Self-extinguishing.

PART 2 PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

A. Extruded-Polystyrene Board Insulation (XPS): ASTM C 578, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84. Provide below grade and below at-grade thru-wall flashing conditions.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Kingspan (formerly DiversiFoam) Products.
      b. Dow Chemical Company (The).
      c. Owens Corning.
      d. Pactiv Building Products.
      e. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.
   2. Type IV, 25 psi.

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. CertainTeed Corporation.
   2. Guardian Building Products, Inc.
   3. Johns Manville.
   4. Knauf Insulation.
   5. Owens Corning.
   6. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

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. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical surfaces, set insulation units Install in earth formed trenches prior to pouring footings according to manufacturer's written instructions.
   1. If not otherwise indicated, extend insulation a minimum of as shown on drawings below exterior grade line.

3.3 INSTALLATION OF CAVITY-WALL INSULATION

A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
   1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 2000 "Concrete Unit Masonry".

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or

use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3 inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
   5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Loose-Fill 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.

3.5 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
   1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
   2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
   3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
   4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

END OF SECTION

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SECTION 07 2700

UNDER-SLAB VAPOR BARRIER

PART 1 GENERAL

1.1 SUMMARY

A. Products Supplied Under This Section.
   1. Vapor Barrier, seam tape, mastic, pipe boots, detail strip for installation under concrete slabs.

B. Related Sections.
   1. Section 033300 "Cast-in-Place Concrete".

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).
   1. ASTM D1709 - 09 Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.
   2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
   3. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
   4. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
   5. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
   6. ASTM F1249-01 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

B. American Concrete Institute (ACI):
   1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.3 SUBMITTALS

A. Quality Control / Assurance.
   1. Independent laboratory test results showing compliance with ASTM & ACI Standards. ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.
   2. Manufacturer’s samples, literature.
   3. Manufacturer’s installation instructions for placement, seaming and pipe boot installation.
   4. Single source: All materials and accessories must be provided by manufacturer and meet manufacturer’s written approval.
   5. 12 x 12 sample of each product being provided by contractor.

1.4 PRE-INSTALLATION MEETING

A. General Contractor to have vapor barrier installer attend Cast-in-Place Concrete Pre-Installation Meeting.

1.5 QUALITY ASSURANCE

A. Vapor Barrier installer required to have Architect and manufacturer representative review vapor barrier installation for prior to pouring concrete. Manufacturer representative to provide written confirmation the vapor barrier has been installed according to ASTM E1643.

PART 2 PRODUCTS

2.1 MATERIALS

A. Vapor Barrier.
   1. Vapor Barrier must have the following qualities.
      a. Strength: ASTM E 1745 Class A.
      b. Permeance Rating: ASTM E-96 Less than 0.01 perms after mandatory conditioning tests per ASTM E 1745 (7.1.1-7.1.5), not less than 15 mils (0.375-mm) thick.
      c. Puncture Resistance: ASTM D1709 minimum 2200 grams.
      d. Tensile Strength: ASTM D882 minimum 50.0 lbf/in.
   2. Vapor Barrier Products.
      a. Basis of Design: Stego Wrap (15 mil) Vapor Barrier by STEGO INDUSTRIES LLC, San Juan Capistrano, CA (877) 464-7834 www.stegoindustries.com.
      b. Reef-Industries - Vaporguard.
      c. Fortifiber Moistop Ultra 15 mil.
      d. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

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. Mastic: Product recommended by vapor-retarder manufacturer for sealing vapor barrier penetrations.

D. Pipe Boots: Manufacturer’s standard, factory-fabricated boots, manufactured of 15 mil vapor barrier material.

E. Perimeter/Edge Seals: Manufacturer-recommended two-sided seaming tape and/or termination bars.
   1. Stego “Crete Claw” preferred for Stego installations.
   2. Stego “Stegotack” tape with term bar.
   3. Use of single-sided seaming tape to seal perimeter must be submitted to architect for pre-approval.
   4. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

PART 3 EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by architect or geotechnical firm.
   1. Level and tamp or roll aggregate, sand, or tamped earth base.

3.2 INSTALLATION

A. PRIOR TO CONCRETE PLACEMENT, RECEIVE LETTER FROM VAPOR BARRIER MANUFACTURER VERIFYING INSTALLATION IS PER ASTM E1643.

B. Install vapor barrier in accordance ASTM E1643.
   1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
   2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, waterstops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.
      a. Seal vapor barrier to the entire slab perimeter using Stego Crete Claw, per manufacturer's instructions.
   3. Overlap joints 6 inches and seal with manufacturer’s seam tape.
   4. Apply seam tape/Crete Claw to clean and dry vapor barrier.
   5. Seal all penetrations (including pipes) per manufacturer’s instructions.
   6. Avoid the use of non-permanent stakes driven through vapor retarder.
   7. If non-permanent stakes are driven through vapor retarder, repair as recommended by vapor retarder manufacturer.
   8. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile strength.

END OF SECTION

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SECTION 07 4112

MANUFACTURED METAL SOFFIT PANELS

PART 1 GENERAL

1.1 SUMMARY

A. The section includes metal soffit panels.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):

B. Underwriters Laboratories (UL Classified Tests):

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
   1. SMACNA Architectural Sheet Metal Manual.

1.3 PRE-INSTALLATION MEETING

A. Pre-Installation Meeting: Conduct conference at Project site.

1.4 SUBMITTALS

A. Product Data: For each type of product. Include product test reports.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Special Warranty: Installer’s standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

C. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Finish Warranty Period: 20 years from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Provide metal panel system capable of withstanding effects of following loads, based on testing according to ASTM E 1592:
   1. Deflection Limits: For wind loads, no greater than 1/240 of the span.
   2. Static Air Infiltration of completed roof system: Maximum of 0.06 cfm/sf with 6.24 kPa air pressure differential as per ASTM E283/1680.
   3. Water Infiltration: No evidence of water penetration at inward static air pressure differential of not less than 6.24 psf and not more than 12.0 psf per ASTM E331/1646.
   4. 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.
      a. Temperature Change (Range): 120°F ambient.

2.2 VENTED SOFFIT PANELS

A. Basis of Design: PAC-CLAD Soffit Panels as manufactured by Petersen Aluminum Corporation (800-323-1960).
   1. Type: PAC-850 Soffit (Half Vent) Panel.
   2. Material: 0.032-in ga alloy 3105-H14 Aluminum.
   3. Panel Dimension: 12 in o.c. V grooved panels.
   4. Texture: Smooth.

B. Panel Finish:
   1. Panel Exposed Surface: PAC-CLAD finish and color selected from manufacturer’s full range of colors.
   2. Panel Non-Exposed Surface: Polyester washcoat with dry film thickness of 0.3 mils.

C. Flashing and Trim: Manufacturer’s standard flashing and trim profiles, factory formed, gauge as recommended by manufacturer, color, and finish to match metal roofing panels.

D. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 NON-VENTED SOFFIT PANELS

A. Material: 24-gauge minimum, galvanized sheet steel, ASTM A446.

B. Type: Roll formed flush, flat panel with interlocking edges and concealed fasteners; Pac-Clad Flush Soffit Panel as manufactured by Petersen Aluminum.

C. Size: 11 inches wide by 1 inch deep.

D. Finish: Two-coat, fluoropolymer, thermos-cured system with fluoropolymer coat containing not less than 70 percent polyvinylidene fluoride resin by weight; full strength Kynar500 or Hylar 5000 finish.

E. Color: As selected by Architect from Manufacturer’s standard colors.

2.4 FABRICATION

A. General:
   1. Continuous Length: Fabricate panels 20’ and less in one continuous length.
   2. Trim and Flashings: Fabricate trim and flashings from same material as soffit material.

2.5 FINISHES

A. Factory Applied Finish:
   1. Exposed Side: Full-strength fluoropolymer 70% Kynar 500 system of 1.0 mil total dry film thickness.
   2. Non-Exposed Side: Wash coat of 0.3 - 0.4 mil dry film thickness.
   3. Texture: Smooth texture.
   4. Protective film: Strippable vinyl film applied during panel fabrication and finishing.

2.6 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Sub Framing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. 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 pre-molded 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. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching the color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturers that are compatible with panel materials, are nonstaining, and do not damage panel finish.
   1. Sealant Tape: Pressure-sensitive, 100 percent solid, gray polyisobutylene compound sealant tape with release-paper backing; 1/8-inch-thick.
   2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

PART 3 EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install sub-framing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written

recommendations.

3.2 METAL PANEL INSTALLATION

A. Metal Soffit Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
   1. Apply panels and associated items true to line for neat and weathertight enclosure.
   2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
   3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
   4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

B. Watertight Installation:
   1. Apply continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed for watertight panels.
   2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
   3. At panel splices, nest panels with minimum 6 inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

D. 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 are permanently watertight.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain clean condition during construction.

END OF SECTION

SECTION 07 4643

ENGINEERED WOOD SIDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Engineered wood siding.
      a. Panel and lap siding.
      b. Trim and fascia.
   2. Accessories.

B. Related Requirements:
   1. Section 05 4000 "Cold-Formed Metal Framing" for metal stud substrate support framing.
   2. Section 06 1053 "Miscellaneous Rough Carpentry" for wood stud substrate support framing.
   3. Section 06 1600 "Sheathing" for wall sheathing substrates.
   4. Section 07 2100 "Thermal Insulation" for continuous insulation behind exterior cladding.
   5. Section 07 9200 "Joint Sealants" for sealants at edges and transitions between composite composition siding system and exterior cladding.

1.2 DEFINITIONS

A. Treated Engineered Wood: Engineered wood products manufactured for exterior use treated with manufacturer's proprietary process to resist fungal decay and termite damage.

1.3 COORDINATION

A. Coordinate engineered wood siding installation with flashings, trim, and construction of other adjoining work to ensure proper sequencing, construction progress, and to provide a leak resistant, secure, and noncorrosive installation.

1.4 PRE-INSTALLATION MEETINGS

A. Coordinate with Division 00 & 01 Specifications.

B. Pre-Installation Meeting: Conduct meeting at Project site.
   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, to attend the meeting. Advise Architect, Construction Manager and , and Owner's Commissioning Authority of scheduled meeting dates and times a minimum of 14 days prior to meeting.
   2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
      a. Schedule.
      b. Responsibilities.
      c. Critical path items.
      d. Submittals.

1.5 QUALITY ASSURANCE

A. Panel to comply with HUD-UM-40c - HUD Building Product Standards and Certification Program for Plywood and Other Performance Rated Wood-Based Structural-Use Panels.

1.6 SUBMITTALS

A. Product Data: For each type of product and component included in engineered wood siding system. Include the following:
   1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of product and accessory included in siding system.
   2. Installation methods, including nailing patterns.
   3. Siding manufacturer's requirements for products to be installed by others.
   4. Maintenance and periodic inspection recommendations.

B. Shop Drawings: For engineered wood siding.
   1. Include plans, elevations, sections, and attachment details.
   2. Detail expansion joints, material joints, angle changes, flashings, and abutment to adjacent Work.

C. Samples for Initial Selection: For engineered wood siding, including related accessories.

D. Samples for Verification: For each type, color, texture, and pattern required.
   1. 6-inch-long sample of engineered wood siding and trim.

E. Product Test Reports: For each product, APA and HUD tests performed by a qualified testing agency.

F. Evaluation Reports: For engineered wood siding system, from ICC-ES in compliance with AC321.

G. Sample warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

B. Manufacturer's Trim and Siding Limited Warranty: Manufacturer agrees to compensate the owner for the material cost of the affected product to repair or replace components of engineered wood siding against substrate damage within specified warranty period.
   1. Substrate damage is defined as buckling, overlay Issues and ZB resistance issue caused by manufacturing defect.
   2. Hail damage is defined as a crack or chip in the surface overlay, or product substrate dents exceeding 3/8-inch in length or diameter and is caused by hail.
   3. Limited Warranty Period: 50 years from date of installation and transferred to Owner on date of Substantial Completion.
   4. Warranty to be clearly noted or highlighted.

C. Manufacturer's Trim and Siding Prefinish Limited Warranty: Manufacturer agrees to compensate the owner for the material cost of the affected product to repair or replace components of prefinished engineered wood siding against finish and substrate damage within specified warranty period.
   1. Substrate damage is defined as buckling, overlay Issues and ZB resistance issue caused by manufacturing defect.
   2. Hail damage is defined as cracks or chips in the surface overlay or dent in the substrate of the product that exceeds 3/8-inch in length or diameter, and is caused by hail.
   3. Finish damage is defined as, under normal conditions and use, discoloring due to chalking, peeling, blisters, cracks; erosion to the extent of exposing the substrate; or yellowing or color fade change from light exposure not to exceed 5 Delta E CMC (2:1).
   4. Limited Warranty Period for Substrate: 50 years from date of installation and transferred to Owner on date of Substantial Completion.
   5. Limited Warranty Period for Finish: 15 years from date of installation and transferred to Owner on date of Substantial Completion.
   6. Warranty to be clearly noted or highlighted.

D. Manufacturer's Accessories and Non-Standard Applications Limited Warranty: Manufacturer agrees to compensate the owner for the material cost of the affected product to repair or replace components of manufacturer's accessories and when used in approved non-standard applications against substrate and finish damage within specified warranty period.
   1. Substrate damage is defined as buckling, overlay Issues and ZB resistance issue caused by manufacturing defect.
   2. Hail damage is defined as cracks or chips in the surface overlay or dent in the substrate of the product that exceeds 3/8-inch in length or diameter, and is caused by hail.
   3. Finish damage is defined as, under normal conditions and use, discoloring due to chalking, peeling, blisters, cracks; erosion to the extent of exposing the substrate; or yellowing or color fade change from light exposure not to exceed 5 Delta E CMC (2:1).
   4. Limited Warranty Period for Substrate and Finish: 10 years from date of installation and transferred to Owner on date of Substantial Completion.
   5. Warranty to be clearly noted or highlighted.

1.8 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as indicated on Drawings, including corner, trim, fascia, supports, attachments, and accessories.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components and other manufactured items so as not to be damaged or deformed. Package components for protection during transportation and handling with manufacturer's name and identification of products.

B. Unload, store, and erect components in a manner to prevent bending, warping, twisting, and surface damage. Maintain slip sheet until piece is being prepared for installation.

C. Store components on flat surfaces clear of the ground. Store under roof or covered with suitable weathertight and ventilated covering, and in accordance with manufacturers' written instructions.

PART 2 PRODUCTS

2.1 SOURCE LIMITATIONS

A. Provide components and materials specified in this Section from single manufacturer for a complete and compatible assembly.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide engineered wood siding system tested to APA PS2 and PRP 108, in compliance with IBC Section 2308.9.3, Table 2308.9.3(5), and certified to be without permanent deformation or failure of structural members in accordance with design wind velocities for Project geographic location and probability of occurrence based on data from wind velocity maps provided in ASCE 7 and as approved by authorities having jurisdiction (AHJ).
   1. Design Loads: As indicated on Drawings.

B. Structural: Test in accordance with FL TAS 202 as follows:
   1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Minimum test duration in accordance with FL TAS 202 is 10 seconds, which is historically U.S. practice.
   4. Test Durations: As required by design wind velocity, but not less than 10 seconds.

C. Fire-Resistance Performance: Comply with ASTM E119 for testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency acceptable to AHJ.
   1. Surface-Burning Characteristics: Provide engineered wood siding system with a Class C flame-spread index of 76 to 200 or less and a smoke-developed index of 0 to 450 or less when tested in accordance with ASTM E84 and UL 723.

D. Thermal Movement Performance: 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.

E. Composite Wood Products: Products to be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or made with no added formaldehyde.

F. Composite Wood Products: Products to be made without added urea formaldehyde.

2.3 ENGINEERED WOOD SIDING

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01

Specifications.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Louisiana-Pacific Corporation; LP® SmartSide® Trim & Siding and ExpertFinish® Trim & Siding or comparable product by one of the following:
   1. Allura.
   2. James Hardie.

C. Treated Engineered Wood Lap Siding: Exterior-grade, resin-saturated, paper overlay laminated to EPA-registered zinc-borate-treated engineered wood siding. Exposed edges sealed for moisture resistance. Manufacturer's acrylic finish.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Louisiana-Pacific Corporation; LP SmartSide Lap Siding and ExpertFinish Lap & Siding, 76 Series or comparable product.
   2. Thickness: 0.354-inch total thickness.
   3. Width: 7.84 inches.
   4. Length: 16 ft.
   5. Color: As selected by Architect from manufacturer's full range.
   6. Texture: Smooth finish.

D. Treated Engineered Wood Panel Siding: Exterior-grade, resin-saturated, paper overlay laminated to EPA-registered zinc-borate-treated engineered wood siding. Exposed edges beveled and sealed for moisture resistance. Manufacturer's acrylic finish.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Louisiana-Pacific Corporation; LP SmartSide Panel Siding, 38 Series or comparable product.
   2. Thickness: 0.418-inch.
   3. Width: 47.88 inches.
   4. Length: 10 ft.
   5. Edges: Square.
   6. Grooves: Channel grooves at none o.c.
   7. Color: Primed.
   8. Texture: Smooth finish.

2.4 ACCESSORIES

A. Fasteners: Hot-dipped galvanized nails, with 0.092-inch-diameter shank, in length required to penetrate structural framing a minimum of 1-1/2 inches, as recommended in writing by composite siding system manufacturer suitable for and compatible with system materials. Larger diameter fasteners may be required depending on wind pressure, wind speed, and wind exposure category limitations for structures in product approvals PR-N124 or ESR-1301.

B. Sealant: ASTM C920, minimum Class 25 sealant.

C. Panel edge and transition modlings:
   1. Provide extruded moldings at the edges and between panels as indicated on drawings.
      a. Basis of design: Easytrim Reveals with stainless steel screws.
         Substitutions allowed in accordance with Division 00 & 01 Specifications.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, engineered wood siding system supports, and other conditions affecting performance of the Work.
   1. Examine wall framing to verify that support members and anchorage have been installed within alignment tolerances required by engineered wood siding manufacturer.
   2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by engineered wood siding manufacturer.
      a. Verify that air and moisture barrier has been installed over sheathing substrate to prevent air infiltration and water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install engineered wood siding in accordance with manufacturer's written instructions in orientation, sizes, and locations indicated. Anchor engineered wood siding and other components of the Work securely in place.
   1. Shim or otherwise plumb substrates receiving engineered wood siding system.
   2. Flash engineered wood siding at perimeter of all openings.
   3. Locate and space fastenings in uniform vertical and horizontal alignment.
   4. Seal engineered wood substrates exposed to weather to prevent moisture intrusion and water buildup.
      a. Seal around penetrations.
      b. Seal each exposed cut of siding and trim. It is not recommended to field spray-applied coatings on cuts.
      c. Seal each butt joint from weather by covering with joint moldings, sealant, or factory prefinished ends.
   5. Install flashing and trim as engineered wood siding work proceeds.
   6. Align bottoms of engineered wood siding.
   7. Provide weathertight escutcheons for pipe- and conduit-penetrating engineered wood siding system.

B. Metal Protection: Where dissimilar metal flashings contact each other or corrosive substrates, protect against galvanic action as recommended in writing by siding manufacturer.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual". Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.
   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 to achieve water resistant performance.

E. Replace engineered wood siding components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

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SECTION 07 5400

THERMOPLASTIC MEMBRANE ROOFING FULLY ADHERED

PART 1 GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Install a watertight sheet membrane and base flashing roofing system that will not permit passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. All materials, details and methods employed for the installation of the membrane roof must be capable of obtaining a 30 year warranty. Only a 25 year warranty will be provided, but the completed work must be eligible to receive a 30 year warranty.

1.2 SUBMITTALS

A. Product Data: For each roofing product indicated.

B. Shop Drawings: Include details of base flashings, membrane terminations, and tapered insulation.

C. Samples: For each product included in membrane roofing system.
1. Insulation board.
2. Fasteners and plates.
3. Coverboard.
4. Membrane.
5. Walkway pad.
6. Hand welded seam samples.

D. Research/evaluation reports.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data.

B. Special Warranty: Manufacturer's standard form, without monetary limitation and signed by manufacturer, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leak.
1. Warranty period: 25-years Total System Warranty from date of Substantial Completion.
2. Warranty shall be clearly noted or highlighted.

C. Special Project Warranty: Submit roofing installer’s warranty covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, roof insulation, fasteners, adhesives, cover boards, substrate boards, vapor retarders, sheet metal and walkway products, for the following warranty period:
1. Warranty period: 1 year from date of Substantial Completion.
2. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

A. Fire/Windstorm Classification: Class 1A-90. Fire classification to comply with ASTM E108 for application and slopes indicated.
   1. Comply with ASHRAE Climate Zone 5. 2012 IECC.

B. Hail-Resistance Rating: VSH.

C. Manufacturer’s Technical Inspector to provide twice monthly inspections and be on site to close out project prior to installer leaving project.

D. Ponding water: At completion of membrane installation no area larger than 1 square foot will be allowed to hold water more than 24 hours after a rain event. If areas of ponding are observed after a rain event, the area must be reworked to ensure that the roof does not hold ponding water.

1.5 PRE-INSTALLATION MEETING

A. Conduct meeting at Project site. Manufacturer’s Technical Inspector to be in attendance.

1.6 JOB CONDITIONS

A. Roofing materials may be installed under certain adverse weather conditions but only after consultation with Membrane manufacturer, as installation time and system integrity may be affected.

B. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be cleaned and heat welded before leaving the job site that day.

C. Schedule and execute all work without exposing interior building areas to effects of inclement weather.

D. All surfaces to receive new insulation, membrane or flashings are to be dry. Should surface moisture occur, provide necessary equipment to dry surface prior to application.

E. Secure all new and temporary construction, including equipment and accessories to preclude wind blow-off and subsequent roof or equipment damage.

F. Install uninterrupted water stops at end of each day's work. Completely remove before proceeding with next day's work. Water stops not to emit dangerous or unsafe fumes or remain in contact with finished roof as installation progresses. Replace contaminated membrane at no cost to the Owner.

G. The Applicator is cautioned that certain roofing membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials and such materials are not to remain in contact with membranes. Consult Membrane manufacturer regarding compatibility, precautions and recommendations.

H. Arrange work sequence to avoid use of newly constructed roofing as walking surface or for equipment movement and storage. Where such access is absolutely required, provide all

necessary protection and barriers to segregate work area and prevent damage to adjacent areas. Provide substantial protection layer consisting of plywood over plywood over insulation board placed on tarps for all new and existing roof areas that receive rooftop traffic during construction.

I. Prior to and during application, remove all dirt, debris and dust from surfaces by vacuuming, sweeping, blowing with compressed air or similar methods.

J. Follow all safety regulations as required by OSHA and other applicable authority(s) having jurisdiction.

K. Collect scrap roof membrane for return to manufacturer for recycling. Deposit other roofing waste material in appropriate refuse containers.

L. Take precautions so that storage and application of materials and equipment does not overload roof deck or building structure.

M. Do not store or use flammable adhesives and deck primers in vicinity of open flames, sparks and excessive heat.

N. Report all rooftop contamination that is anticipated or that is occurring to Membrane manufacturer to determine corrective steps to be taken.

O. Verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Report any blockages in writing (letter copy to Membrane manufacturer) to Owner's Representative for corrective action prior to installation of Membrane manufacturer roof system.

P. Immediately stop work if any unusual or concealed condition is discovered and immediately notify Owner of condition in writing for correction (letter copy to Membrane manufacturer).

Q. Complete site cleanup, including both interior and exterior building areas that have been affected by construction, to Owner's/Architects' satisfaction.

R. Repair all landscaped areas damaged by construction activities at no cost to Owner.

S. Conduct fastener pullout tests in accordance with latest version of SPRI/ANSI Fastener Pullout Standard to verify condition of deck/substrate and to confirm expected pullout values.

T. Do not install roofing membrane under following conditions without consulting Membrane manufacturer's Technical Dept. for precautionary steps:
   1. Roof assembly permits interior air to pressurize membrane underside.
   2. Any exterior wall has 10 percent or more of surface area comprised of opening doors or windows.
   3. Wall/deck intersection permits air entry into wall flashing area.

U. Take precautions when using adhesives at or near rooftop vents or air intakes. Coordinate operation of vents and air intakes to avoid intake of adhesive odor while ventilating building. Keep lids on unused cans at all times.

V. Wear protective wear when using solvents or adhesives or as required by job conditions.

W. Roofing and steel deck membranes are slippery when wet or covered with snow, frost, or ice. Working on surfaces under these conditions is hazardous. Appropriate safety measures must be implemented prior to working on such surfaces. Always follow OSHA and other relevant fall protection standards when working on roofs.

PART 2 PRODUCTS

2.1 MEMBRANE - 80 MIL

A. Polyester reinforced Thermoplastic Polyolefin (TPO): Uniform, flexible elastomer sheet formed from a laminated core and highly UV resistant top ply with a non-woven polyester scrim reinforcement. Minimum thickness to be verified by officer of system manufacturer involved directly with membrane production.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. GAF Materials Corporation: EverGuard Extreme 80 mil TPO.
      b. Elevate, formerly Firestone Building Products: UltraPly 80 mil TPO.
      c. Johns Manville Building Materials: JM TPO 80 mil TPO.
      d. Versico Versiweld.
      e. Carlisle Syntec.
      f. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Conform to ASTM D6878, "Standard for Thermoplastic Polyolefin Membrane”.

C. Color of Membrane: White.

D. Typical Physical Properties:

Parameters	ASTM Test Method	Minimum Requirement
Nominal Thickness, min., inches	D751	0.080
Elongation at Break, min. (machine x tranverse)	D751	370 lbf x 330 lbf
Seam strength(²), min. (% of tensile strength)	D751	150 lbf (membrane failure)
Retention of Properties After Heat Aging	D573	-
Tensile Strength, min., (% of original)	D3054	100%
Elongation, min., (% of original)	D3054	100%
Tearing Strength, min., lbf	D751 8” x 8”	65 lbf x 130 lbf
Low Temperature Bend, -40ºF	D2137	Pass at -40ºF
Accelerated Weathering Test (Xenon Arc)	G155	5,000 Hours Exposure
Cracking (7x magnification)	-	None
Discoloration (by observation)	-	None
Crazing (7x magnification)	-	None
Linear Dimensional Change	D1204 @ 158ºF, 6 hrs.	0.40 %
Water Absorption	D471 @ 158ºF, 1 week.	0.70 %
Reflectivity (white)	C1549	0.835
Emissivity (white)	C1371	0.84

2.2 FLASHING MATERIALS

A. Wall/Curb Flashing.
   1. Manufacturers standard reinforced flashing membrane.
      a. A polyester reinforced membrane adhered to approved substrate using Manufacturers a proved adhesive, minimum thickness 50 mils.

B. Auxiliary Flashing Materials: Recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
   1. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, thickness, and color as sheet membrane.
      a. Provide TPO-clad flashing at locations noted on Drawings.
   2. Cone and pipe vents: Manufacturer’s standard preformed flashings designed to accommodate various sizes of vents and pipe penetrations.
   3. Formed flashings: manufacturer’s standard T-joint covers, inside and outside formed corners, and penetration pockets with 2-part pourable sealant.
   4. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.
   5. Compression Bars: Metal termination bars, metal battens, fasteners, termination reglets, and other accessories.

2.3 ROOF INSULATION

A. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, 25 psi, felt or glass-fiber mat facer on both major surfaces. R=30 min., not less than 5.2 inches.

B. Tapered Insulation: Provide factory-tapered polyisocyanurate insulation boards fabricated to slope of 1/4-inch per 12 inches, unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

D. Horizontal Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2-inch thick, factory primed, equivalent to Georgia-Pacific Dens Deck.

2.4 ATTACHMENT COMPONENTS

A. Membrane Adhesive.
   1. Manufacturers standard solvent based bonding adhesive. Water base if temperatures allow.

2.5 WALKWAY PADS

A. Walkway Pads: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads, approximately 3/16-inch thick, and acceptable to roofing system manufacturer.

2.6 MISCELLANEOUS ACCESSORIES

A. Sealing Tape Strip: Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as preventive measure against air and wind-blown moisture entry. Use of this product only allowed when approved in writing by Architect at specific locations.

2.7 MISCELLANEOUS FASTENERS AND ANCHORS

A. All fasteners, anchors, nails, straps, bars, etc: Post-galvanized steel, aluminum, or stainless steel. Mixing metal types and methods of contact shall be assembled to avoid galvanic corrosion.
   1. Fasteners for attachment of metal to masonry: Expansion type fasteners with stainless steel pins.
   2. Concrete fasteners and anchors: Approved for use by fastener manufacturer with minimum embedment of 1-1/4 inch.
   3. Deep buttress thread fasteners required for fastening insulation to deck; see Part 3 - Execution.
   4. Miscellaneous wood fasteners and anchors used for flashings: Approved for use by fastener manufacturer with minimum embedment of 1 inch.

PART 3 EXECUTION

3.1 PROTECTION

A. Contractor(s): to be responsible for protecting ALL existing roof membranes while mechanical work is completed.
   1. This protection needs to be coordinated between the Mechanical Contractor and the Roofing Contractor, so it shall be coordinated and monitored by the contractor(s):
   2. Protection is defined as: Canvas Tarps and 1/4-inch Masonite over the roof membrane in ALL work areas.

3.2 SUBSTRATE INSPECTION

A. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.

B. Substrate to be dry, clean smooth, free of flaws, sharp edges, loose and foreign material, oil, and grease. Confirm substrate compatibility. Begin work only after defects have been corrected. Commencement of work indicates applicator’s acceptance of substrate.
   1. All roof surfaces shall be free of water, ice and snow.

C. Applicator: Inspect substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect quality of work.

D. Applicator shall verify that the work done under related sections meets the following conditions:
   1. Roof drains and/or scuppers have been reconditioned and/or replaced and installed properly.
   2. Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.

3.3 WOOD NAILER INSTALLATION

A. Install wood nailers at perimeter of entire roof and around roof projections and penetrations.

B. Anchor nailers to structural elements to resist minimum force of 300 pounds per lineal foot in any direction.
   1. Individual nailer lengths: Not less than 3 feet long.
   2. Fastener spacing: No more than 12 inches on center or at distance to match structural framing. Stagger fasteners 1/3 the nailer width and installed within 6 inches of each end. Two fasteners shall be installed at the ends of nailer lengths. Meet current ANSI 7 fastener spacing requirements.

C. Thickness: As required to match total substrate and insulation height to allow smooth transition.

D. Use stainless steel, corrosion resistant, fasteners when mechanically attaching any membrane to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal edge detailing, separation layer between the metal and ACQ treated wood is required.

3.4 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
   1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
   2. At internal roof drains, conform to slope of drain sump.
      a. Trim cover board so that water flow is unrestricted.
   3. Cut and fit cover board tight to nailers, projections, and penetrations.
   4. Loosely lay cover board over substrate.
   5. Adhere cover board to substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
      a. Set cover board in a solid mopping of hot roofing asphalt, applied within ± 25°F of equiviscous temperature.
      b. Set cover board in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
      c. Set cover board in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
   6. Install slip sheet over cover board and beneath roof membrane.

3.5 INSULATION INSTALLATION

A. Insulation shall be installed according to membrane manufacturer's instructions.

B. Insulation shall be neatly cut to fit around penetrations and projections.

C. Install tapered insulation in accordance with insulation manufacturer's shop drawings.

D. Install tapered insulation around drains creating a drain sump.

E. Do not install more insulation board than can be covered with membrane by the end of the day or the onset of inclement weather.

F. Use at least 2 layers of insulation when the total insulation thickness exceeds 2-1/2 inches. Stagger joints at least 12 inches between layers.

G. Mechanical Attachment.
   1. Insulation shall be mechanically fastened to the deck with approved deep buttress thread fasteners and plates at a rate according to FM's and Membrane manufacturer's recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.

H. 2-Part Foam Insulation Adhesive.
   1. Immediately set insulation boards (4’ x 4’ maximum size) into wet applied ribbons of adhesive. Do not allow the adhesive to skin over. Walk insulation boards into place to ensure full embedment. Within 5-15 minutes the boards are securely attached to the substrate. In warmer weather this process is a little quicker. In colder weather the process is a little slower. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than 1/2-inch in 12 inches, begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement. Only areas that can be made completely watertight in the same day’s operations shall be coated. Unused adhesive can be applied at a later date by simply replacing the mixing tip.
   2. For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.

3.6 MEMBRANE INSTALLATION

A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.

B. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.

D. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.

E. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

F. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
   1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane if required by manufacturer. Lap Sealant cannot be excluded from warranty.
   2. Verify field strength of seams a minimum of twice daily and repair seam sample areas. Seam samples to be dated and kept for technical inspector / contractor(s) / Owner / Architect inspection.
   3. Submit all test strips to Architect, organized by date, at conclusion of membrane installation for review.
   4. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

G. Install sheet flashings and preformed flashing accessories and adhere to substrate according to roofing system manufacturer's written instructions.
   1. Flash penetrations and field-formed inside and outside corners with sheet flashing as recommended by manufacturer.
   2. Clean seam areas, overlap sheets, and firmly roll flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

3. Test lap edges with probe to verify seam weld continuity. Apply lap sealant and seal exposed edges of sheet flashing terminations.
4. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
5. All clean trimmings and scrap to be stored per manufacturer to be returned for recycling.

3.7 HOT-AIR WELDING OF SEAM OVERLAPS

A. General.
   1. All seams shall be hot-air welded. Seam overlaps should be 1.5 inches wide when automatic machine-welding and 2 inches wide when hand-welding.
   2. All membrane to be welded shall be clean and dry.

B. Hand-Welding: Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.
   1. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

3.8 METAL FLASHINGS

A. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:
   1. Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).
   2. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

B. Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch.

C. Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches on center into the wood nailer or masonry wall.

D. Counter flashings shall overlap base flashings at least 2 inches.

E. Hook strips shall extend past wood nailers over wall surfaces by 1-1/2 inch minimum and shall be securely sealed from air entry.

3.9 WALKWAY INSTALLATION

A. Walkways: Install walkway pads at all roof access points and locations indicated. Heat weld walkway pads to substrate according to roofing system manufacturer's written instructions.

3.10 CLEAN UP

A. Do not allow trash, waste, or debris to collect on the roof. These items shall be removed from the roof on a daily basis.

B. All tools and unused materials must be collected at the end of each workday and stored properly off of the finished roof surface and protected from exposure to the elements.

C. Prior to the manufacturer's inspection for warranty, the applicator must perform a pre-inspection to review all work and to verify all flashing has been completed as well as the

application of all caulking, counter flashings, and terminations.

D. Properly clean the finished roof surface after completion, and make sure the drains and gutters are not clogged.

E. Clean and restore all damaged surfaces to their original condition.

3.11 COMPLETION

A. Prior to demobilization from site, Owner’s Representative and Applicator to review work. Itemize all defects noted and non-compliances with Specifications or recommendations of Membrane manufacturer in a punch list. Applicator to correct items immediately to satisfaction of Owner's Representative and Membrane manufacturer prior to demobilization.

END OF SECTION

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SECTION 07 6200

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufactured sheet metal flashing and counterflashing.
   2. Formed roof drainage sheet metal fabrications.
   3. Formed low-slope roof sheet metal fabrications.
   4. Storefront sill flashing.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
   1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

C. Samples: For each exposed product and for each finish specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.
   1. Warranty shall be clearly noted or highlighted.

1.4 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

B. Provide manufactured roofing specialties, incorporating roof edge treatment that complies with ANSI SPRI ES-1 and recommendations of FM Loss Prevention Data Sheet 1-49 for the following Wind Zone:
   1. Wind Zone 1: Wind pressures of 21 to 30 lbf/sq. ft.
   2. Wind Zone 2: Wind pressures of 31 to 45 lbf/sq. ft.
   3. Wind Zone 3: Wind pressures of 46 to 104 lbf/sq. ft.

1.5 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical storefront sill flashing and fascia, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
   2. Mock-ups, if accepted, may remain part of the work.

C. Pre-Installation Meeting: Conduct meeting at Project site.

PART 2 PRODUCTS

2.1 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required, 0.050-inch-thick.
   1. Exposed Coil-Coated Finishes:
      a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
      b. Color: As selected by Architect from manufacturer's full range.
      c. Aluminum storefront sill flashing at clerestory color: As selected by Architect from manufacturer’s full range of metallics.

2.2 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
   1. Thermal Stability: ASTM D 1970; stable after testing at 240°F.
   2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20°F.

2.3 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal 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.
   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.

b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2-inch-wide and 1/8-inch-thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; 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. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.4 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to the greatest extent possible.
1. Obtain field measurements for accurate fit before shop fabrication.
2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.

B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.

C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.

Rivet joints where necessary for strength.

G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inches-wide wall flanges to interior, and base extending 4 inches beyond can't or tapered strip into field of roof. Fabricate from the following materials and coat with roof membrane material:
   1. Aluminum: 0.032-inch-thick.

B. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
   1. Aluminum: 0.032-inch-thick.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

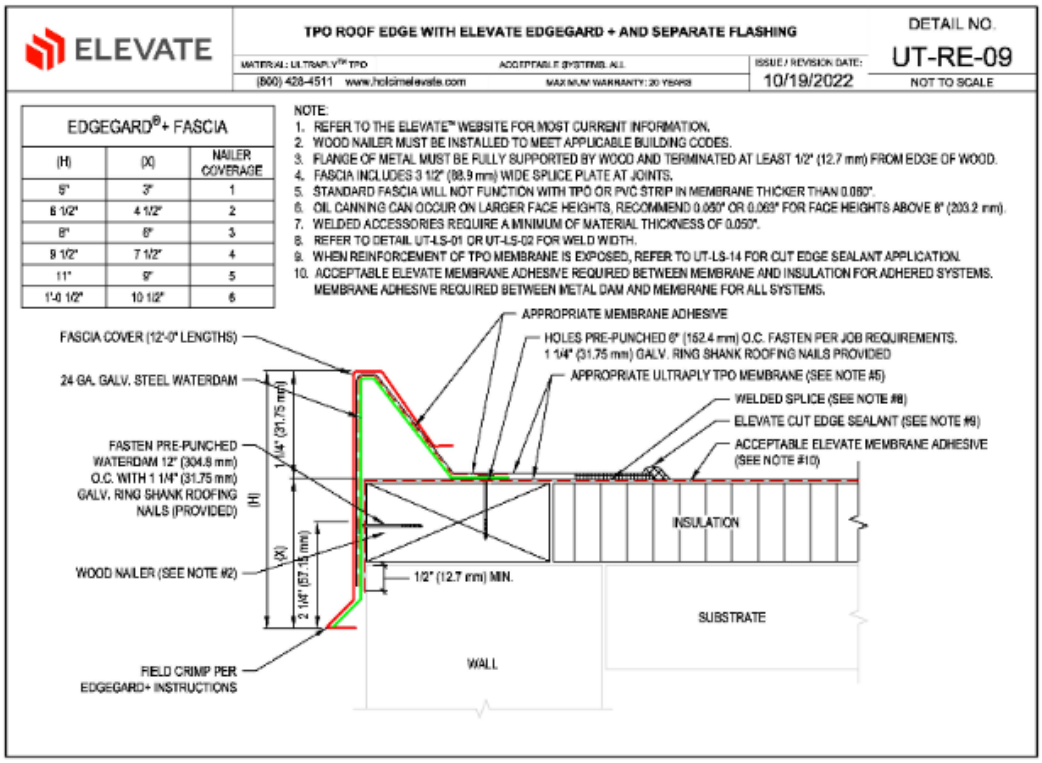
A. Base Flashing: Fabricate from the following materials:
   1. Aluminum: 0.040-inch-thick.

B. Counterflashing and Flashing Receivers: Fabricate from the following materials:
   1. Aluminum: 0.032-inch-thick.

C. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Aluminum-Zinc Alloy-Coated Steel: 0.028-inch-thick.

2.7 METAL FASCIA

A. Fascia Cap: Fabricate in minimum 96-inch-long, but not exceeding 12-foot-long sections. Furnish with 6-inch-wide, joint cover plates. The shop fabricates interior and exterior corners.
   1. Basis of Design: Elevate, EdgeGard as shown below. Height: Shown on drawings.
   2. Locations: All roof parapets and roof edges.
   3. Color: From manufacturer's full range.
   4. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.



B. Construction:
   1. Fascia metal gauge:
      a. 0.040-inch-thick formed aluminum.
      b. 24-gauge galvanized steel.

C. Fascia: Standard 12 feet 0 inches lengths. 7 inches height.

D. Locations.
   1. All roof parapets and roof edges. Note: Fascia will be curved at both the upper entry roof and lower canopy roof over main entry.

2.8 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch-high, end dams. Fabricate from the following materials:
   1. Stainless Steel: 0.0156-inch-thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, 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. Aluminum: 0.032-inch-thick.

PART 3 EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, 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.

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 so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, 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 and levels indicated. 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. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
   4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
   5. Install sealant tape where indicated.
   6. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
   1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.

C. 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 watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4-inch for wood screws and metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal joints as shown and as required for watertight construction.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

B. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.

C. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper or gutter discharge.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3 inch centers.

C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

D. 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 a minimum of 4 inches and bed with sealant.

E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Face Brick".

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and 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.

END OF SECTION

SECTION 07 6310

GUTTERS AND DOWNSPOUTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes prefabricated sheet metal conductor heads and downspouts, with connecting pieces and anchorages.

1.2 REFERENCES

A. ASTM B209 - Aluminum-Alloy Sheet and Plate.

B. SMACNA - Architectural Sheet Metal Manual.

1.3 RELATED SECTIONS

A. Section 07 6200 "Sheet Metal Flashing and Trim".

B. Section 07 4112 "Metal Soffit Panels".

1.4 SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Include plans, elevations, sections, and mounting and attachment details.

C. Samples: For each exposed product and for each color and texture specified.

D. Coordination Drawings: Drawn to scale, and coordinated with each other, using input from installers of the items involved.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of that fail(s) in materials or workmanship within specified warranty period.
   1. Warranty Period: Five year(s) from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

PART 2 PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Gutters and Downspouts: Aluminum, ASTM B209; minimum 0.032-inch-thick minimum; factory applied Fluoropolymer finish to match sheet metal flashing and trim.

B. Downspout Type: Open (3 sided).

C. Colors: As selected by Architect from manufacturer's full range of available colors to match metal fascia and soffit panels.

D. Strainers: Stainless steel screen wire.

E. Gutter Hangers: Stainless steel strap; minimum 0.037-inch x 3/4-inch; prepainted to match gutters; extend 6 inches onto roof; drill and countersink for 2 screws.

F. Downspout Straps: Aluminum, 0.064-inch x 3 inch prefinished to match downspouts.

G. Downspout Adapters: 12-gauge stainless steel.

H. Anchorage Devices: Type recommended by manufacturer and acceptable to Architect.

I. Sealant: As specified under Section 07 9200.

J. Bituminous Compound: Solvent type, acid resistant coating.

2.2 FABRICATION

A. Comply with SMACNA recommendations.

B. Form conductor heads and downspouts of profiles and sizes indicated on Drawings and as required to properly collect and remove water. Provide required connecting pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, and free of distortions and defects detrimental to appearance or performance. Hem exposed edges. Allow for expansion at joints.

D. Allow for field adjustments for proper anchoring and joining to other items.

E. Prepare seams to overlap in the direction of flow.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the surface over which sheet metal is applied is dry, clean, smooth, and free of projections or debris.

3.2 PREPARATION

A. Apply bituminous compound on metal surfaces to be in contact with dissimilar metals or cementitious materials; 7-1/2 mil dry film thickness on each metal surfaces.

3.3 INSTALLATION

A. Comply with SMACNA recommendations.

B. Install gutters and downspouts with allowance for expansion and contraction in accordance

with standard practice of industry. Flash and seal gutters to downspouts.

C. Install gutters level unless otherwise indicated.

D. Slope each gutter run 1 inch from high point to downspout.

E. Install shoe at bottom of downspout to spill onto concrete splash block.

F. Provide fitting from downspout to subsurface drainage.

G. Tie into existing roof drainage system.

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SECTION 07 7200

ROOF ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Roof hatches.

1.2 SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: Show fabrication and installation details for roof accessories.

C. Samples: For each type of exposed factory-applied color finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.

1.3 CLOSEOUT SUBMITTALS

A. Roof Hatch: Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers listed in other Part 2 articles.

2.2 METAL MATERIALS

A. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 coated, and mill phosphatized for field painting.

2.3 ROOF HATCHES

A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
   1. Available Manufacturers:
      a. Babcock-Davis; a Cierra Products Inc. Company.

b. Bilco Company (The).
c. Bristolite Skylights.
d. Custom Curb, Inc.
e. Dur-Red Products.
f. Hi Pro International, Inc.
g. J. L. Industries, Inc.
h. Metallic Products Corporation.
i. Milcor Inc.; a Gibraltar Company.
j. Nystrom, Inc.
k. O'Keeffe's Inc.
l. Precision Ladders, LLC.
m. Roof Products & Systems Corporation.
n. ThyCurb; Div of Thybar Corporation.
o. Wasco Products, Inc.
p. Western Canwell.
q. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loads.
3. Type and Size: Single-leaf lid, 30 by 54 inches.
4. Curb and Lid Material: Galvanized steel sheet, 0.079-inch-thick.
5. Insulation: Polyisocyanurate board.
6. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
7. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
8. Fabricate units to minimum height of 12 inches, unless otherwise indicated.
9. Hardware: Stainless-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
   a. Provide 2-point latch on covers larger than 84 inches.
   b. Provide remote-control operation.
10. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.

PART 3 EXECUTION

3.1 EXAMINATION

A. Report to the Contractor in writing, defects of work prepared by other trades and other unsatisfactory site conditions. Verify site dimensions. Commencement of work will imply acceptance of prepared work.

B. For roofs employing tapered insulation systems, height adjustments may be necessary i.e. ensure anchor eye is minimum 9 inches above roof surface.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Install roof accessories to fit substrates and to result in watertight performance.

C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
   1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
   2. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
   3. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.

D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

E. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

3.3 ADJUSTING AND FINAL INSPECTION

A. Verify all manufactured units have been installed in accordance with specifications and details and will function as intended. Adjust items where necessary to ensure proper operation.

3.4 CLEANING

A. Clean manufactured units using materials and methods approved by manufacturer. Do not use cleaners or techniques which could impair performance of roof accessories.

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SECTION 07 8413

PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 & 01 Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Penetrations in fire-rated vertical assemblies.
   2. Penetrations in fire-rated horizontal assemblies.
   3. Penetrations in smoke barriers.

B. Related Requirements:
   1. Section 078446 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtainwall/floor intersections, and in smoke barriers.

1.3 REFERENCES

A. Test Requirements:
   1. ASTM E 814, “Standard Method of Fire Tests of Through Penetration Fire Stops”.
   2. UL 1479, “Test Requirements of Through-Penetration Firestops”.

B. Underwriters Laboratory (UL) of Northbrook, IL, publishes tested systems in their “FIRE RESISTANCE DIRECTORY”, updated annually.
   1. UL Fire Resistance Directory:
      a. Firestop Devices (XHJ).
      b. Fire Resistance Ratings (BXRH).
      c. Through-Penetration Firestop Systems (XHEZ).
      d. Fills, Voids, or Cavity Material (XHHW).
      e. Forming Materials (XHKU).

C. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

D. ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials.

E. Inspection Requirements: ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops”.

F. International Building Code (IBC 2012).

G. NFPA 101 - Life Safety Code.

H. NFPA 70 - National Electric Code.

1.4 PRE-INSTALLATION MEETINGS

A. Pre-Installation Meeting: Conduct meeting at Project site. A representative for the Authority Having Jurisdiction must be present.

1.5 SUBMITTALS

A. Product Data: Manufacturer’s specifications and technical data for each material, including composition and limitations, documentation of each qualified firestop system to be used, and manufacturer’s installation instructions.

B. Manufacturer’s Engineering Judgment identification number and drawing details when no qualified tested system is available for application, or if engineering judgments have been submitted in the design documents. Engineering judgment to include project name and contractor’s name installing firestop system as described in document.

C. Penetration Firestopping System Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

D. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 SINGLE-SOURCE MANUFACTURER AND INSTALLER

A. All penetration firestopping products installed as part of this Work to be from same manufacturer and installed by a single qualified installer.

B. A single-source manufacturer and installer is required to encompass this Section and Section 078446 "Fire-Resistive Joint Systems".

1.7 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems complying with specified requirements of tested systems. When T-ratings are required by building/fire code, they shall be equal (at minimum) to the required F-rating of the assembly being penetrated.

B. Proposed firestop materials and methods to conform to applicable governing codes having local jurisdiction.

C. Firestop Systems do not reestablish structural integrity of load bearing partitions/assemblies or support live loads and traffic. Installer to consult with structural engineer prior to penetrating load bearing assemblies.

D. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal. Engineering judgment documents follow requirements set forth by the International Firestop Council.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

C. For all fire-resistive systems, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

2.2 MANUFACTURERS

A. Available Products: Subject to compliance with system design requirements, penetration firestopping systems that may be incorporated into the Work include products from the following manufacturers:
   1. Basis-of-Design Manufacturer:
      a. HILTI.
   2. Acceptable Manufacturers:
      a. 3M.
      b. Isolatek International.
      c. Specified Technologies Inc.
   3. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 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.

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. Penetrations in Horizontal Assemblies: 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.
   2. T-Rating: Not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
   1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

F. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with 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".

G. 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.

2.4 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.5 MIXING

A. 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 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer’s requirements, including temperature restrictions.

D. Comply with recommended procures and precautions for remedies described in material safety data sheets as applicable.

E. Damaged or expired materials are not allowed.

F. Materials that contain flammable solvents are not allowed.

3.2 COORDINATION AND PROJECT CONDITIONS

A. Sequence Work to permit firestopping materials to be installed after adjacent and surrounding work is complete. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

B. Notify the Owner's Representative at least one week in advance of firestopping installations; confirm dates and times on days preceding each series of installations. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency (if applicable), or Authority Having Jurisdiction (if applicable) has examined each installation.

C. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

D. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

E. Provide masking and drop cloths during installation to prevent firestopping materials from contaminating adjacent surfaces.

F. 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.

G. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

3.3 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.
   4. Do not proceed until unsatisfactory conditions have been corrected.

B. Prime substrates where recommended in writing by the manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.4 INSTALLATION

A. General: Install penetration firestopping systems in accordance with UL Fire Resistance Directory and 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.
   4. Seal all holes or voids made by penetrations to provide air and water-resistant seal.

D. Avoid penetrating any fire-rated horizontal assemblies, when possible.

3.5 FIELD QUALITY CONTROL

A. Testing Services by Inspecting Agency: Inspecting of completed installations of penetration firestopping systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of systems for the next area until the inspection agency determines completed work shows compliance with requirements.
   1. Inspecting agency shall state in each report whether inspected penetration firestopping systems comply with or deviate from requirements.

B. Remove and replace penetration firestopping systems where inspections indicate that they do not comply with specified requirements.

C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and penetration firestopping systems comply with requirements.

3.6 IDENTIFICATION AND DOCUMENTATION

A. Firestop contractor to supply documentation for each single application addressed. Identify each penetration and joint location installed on project.
   1. Documentation Form for through penetrations to include:
      a. Sequential Location Number.
      b. Project Name.
      c. Date of Installation.
      d. Detailed description of penetration location.
      e. Tested system or engineered judgment number.
      f. Type of assembly penetrated.
      g. Detailed description of size and type of penetrating item.
      h. Size of opening.
      i. Number of sides of assemblies addressed.
      j. Hourly rating to be achieved.
      k. Installer name.
   2. Provide copies to general contractor for project closeout documentation.

B. 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 words in accessible concealed ceiling at 15 feet from end of wall and at intervals not exceeding 30 feet.
   2. Locate words immediately above accessible concealed ceiling in elevation, to be visible from a portable step ladder from below.
   3. Locate words on the public, corridor side of the walls. Adjust plan spacing to shorter intervals, if required, to avoid physical obstructions that hinder installation.

C. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
   1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage".
   2. Contractor's name, address, and phone number.

3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.7 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

A. Systems listed here are derived as Basis-of-Design systems. See Acceptable Manufacturers in Part 2 for accepted alternative approaches.

B. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

C. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under "Firestop Systems."

D. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops".

E. Penetration Firestopping Systems with No Penetrating Items:
1. F-Rating: 2 hours.
2. T-Rating: N/A.
3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. Type of Fill Materials: Per system design.

F. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing:
1. F-Rating: 2 hours.
2. T-Rating: 2 hours (for horizontal assemblies only).
3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. Type of Fill Materials: Per system design.

G. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing:
1. F-Rating: 2 hours.
2. T-Rating: 2 hours (for horizontal assemblies only).
3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. Type of Fill Materials: Per system design.

H. Penetration Firestopping Systems for Electrical Cables:
1. F-Rating: 2 hours.
2. T-Rating: 2 hours (for horizontal assemblies only).
3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
4. W-Rating: No leakage of water at completion of water leakage testing.
5. Type of Fill Materials: Per system design.

I. Penetration Firestopping Systems for Cable Trays with Electric Cables:
1. F-Rating: 2 hours.
2. T-Rating: 2 hours (for horizontal assemblies only).
3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
4. W-Rating: No leakage of water at completion of water leakage testing.

5. Type of Fill Materials: Per system design.

J. Penetration Firestopping Systems for Insulated Pipes:
   1. F-Rating: 2 hours.
   2. T-Rating: 2 hours (for horizontal assemblies only).
   3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
   4. W-Rating: No leakage of water at completion of water leakage testing.
   5. Type of Fill Materials: Per system design.

K. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants:
   1. F-Rating: 2 hours.
   2. T-Rating: 2 hours (for horizontal assemblies only).
   3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
   4. W-Rating: No leakage of water at completion of water leakage testing.
   5. Type of Fill Materials: Per system design.

L. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants:
   1. F-Rating: 2 hours.
   2. T-Rating: 2 hours (for horizontal assemblies only).
   3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
   4. W-Rating: No leakage of water at completion of water leakage testing.
   5. Type of Fill Materials: Per system design.

M. Penetration Firestopping Systems for Groupings of Penetrants:
   1. F-Rating: 2 hours.
   2. T-Rating: 2 hours (for horizontal assemblies only).
   3. L-Rating at Ambient and/or 400°F: Less than 5 cfm/sq. ft.
   4. W-Rating: No leakage of water at completion of water leakage testing.
   5. Type of Fill Materials: Per system design.

END OF SECTION

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SECTION 07 8446

FIRE-RESISTIVE JOINT SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 & 01 Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes fire-resistive joint systems in locations as follows:
   1. Slot gaps between edge of floor slabs and perimeter curtain walls.
   2. Openings between structurally separate sections of walls or floors.
   3. Gaps between the top of walls and ceilings or roof assemblies.
   4. Expansion joints in walls and floors.

1.3 REFERENCES

A. Underwriters Laboratories, Inc. (UL) Fire Resistance Directory, Volume II, updated annually.
   1. Joint Systems (XHBN).
   2. Perimeter Fire Containment Systems (XHDG).
   3. Fire Resistance Ratings (BXRH).
   4. Fill, Voids, or Cavity Material (XHHW).
   5. Forming Materials (XHKU).

B. Omega Point Laboratories, Inc. (OPL) Listed Products Directory, Volume II, updated annually:
   1. Fire Resistant Joint Systems.

C. ASTM E 1966, “Standard Test Method for Fire-Resistive Joint Systems”.

D. ASTM E 1399, “Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Width of Architectural Joint Systems”.

E. ASTM E 84, “Standard Test Method for Surface Burning Characteristics of Building Materials”.

F. ASTM E 2176, “Standard Practice for On-Site Inspection of Installed Fire Stops”.

G. ASTM E 2307, “Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using Intermediate-Sale, Multi-Story Test Apparatus”.

H. ANSI/UL 2079, “Tests for Fire Resistance of Building Joint Systems”.

I. International Firestop Council Recommended (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.

J. International Building Code (IBC 2012).

K. NFPA 101 - Life Safety Code.

1.4 PRE-INSTALLATION MEETING

A. Pre-Installation Meeting: Conduct meeting at Project site. A representative for the Authority Having Jurisdiction must be present.

1.5 SUBMITTALS

A. Product Data: Manufacturer's specifications and technical data for each material, including composition and limitations, documentation of each qualified firestop system to be used, and manufacturer's installation instructions.

B. Manufacturer's Engineering Judgment identification number and drawing details when no qualified tested system is available for application, or if engineering judgments have been submitted in the design documents. Engineering judgment to include project name and contractor's name installing firestop system as described in document.

C. Penetration Firestopping System Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

D. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 SINGLE-SOURCE MANUFACTURER AND INSTALLER

A. All penetration firestopping products installed as part of this Work to be from same manufacturer and installed by a single qualified installer.

B. A single-source manufacturer and installer is required to encompass this Section and Section 078413 "Penetration Firestopping".

1.7 QUALITY ASSURANCE

A. Firestop System installation to meet requirements of ASTM E 1966 and/or ANSI/UL 2079 tested and listed assemblies that provide fire-resistance ratings not less than that of construction in which joint occurs.

B. Proposed firestop materials and methods also to conform to applicable governing codes having local jurisdiction.

C. Firestop systems do not re-establish structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Install to consult structural engineer prior to penetrating any load bearing assembly.

D. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal. Engineering judgment documents to follow requirements set forth by International Firestop Council.
   1. Basis-of-Design Engineering Judgments have been included directly after this section to

either be used for this Project, or as reference for the generation of other proprietary judgments.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.

B. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

C. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities indicated as determined by UL 2079.

D. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule, as determined by NFPA 285 and UL 2079.
   1. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.

E. For all fire-resistive systems, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

F. Movement: All joints installed are to be dynamic, not static.

2.2 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, fire-resistive joint systems that may be incorporated into the Work include products from the following manufacturers:
   1. Basis-of-Design Manufacturer:
      a. HILTI.
   2. Acceptable Manufacturers:
      a. 3M.
      b. Isolatek International.
      c. Specified Technologies Inc.
   3. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 FIRE-RESISTIVE JOINT SYSTEMS

A. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 2 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

B. Joints in or between fire rated construction: Provide joint firestopping systems with ratings determined per UL 2079 or ASTM E1966:
   1. F-Rating: not less than fire resistance rating of construction they will join.
   2. T-Rating (for horizontal assemblies only, when applicable by code): not less than fire resistance rating of construction they will join.

C. Joints at Exterior Curtain Wall/Floor Intersections: Provide joint firestopping systems with ratings determined per ASTM E 2307:
   1. F-Rating: not less than the fire resistance rating of construction they will join.
   2. T-Rating (for horizontal assemblies only, when applicable by code): not less than fire resistance rating of construction they will join.

D. Joints in Smoke Barriers: Provide joint firestopping systems with ratings determined per UL 2079:
   1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.

E. Joints at Intersection between Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Provide joint firestopping systems with ratings determined by ASTM E 2837.

F. Mold Resistance: Provide joint firestopping system sealant with mold and mildew resistance rating of 0 as determined by ASTM G21.

2.4 MIXING

A. 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 DELIVERY, STORAGE, AND HANDLING

A. Deliver firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multicomponent materials.

B. Coordinate delivery of materials with schedule installation date to allow minimum storage time at job site.

C. Store materials under cover and protect from weather and damage in compliance with manufacturer’s requirements, including temperature restrictions.

D. Comply with recommended procures, precautions for remedies described in material safety data sheets as applicable.

E. Damaged or expired materials are not allowed.

F. Materials that contain flammable solvents are not allowed.

3.2 COORDINATION AND PROJECT CONDITIONS

A. Sequence Work to permit firestopping materials to be installed after adjacent and surrounding work is complete. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.

B. Notify the Owner's Representative at least one week in advance of firestopping installations; confirm dates and times on days preceding each series of installations. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency (if applicable), or Authority Having Jurisdiction (if applicable) has examined each installation.

C. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

D. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

E. Provide masking and drop cloths during installation to prevent firestopping materials from contaminating adjacent surfaces.

F. 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.

G. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

3.3 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.
   4. Do not proceed until unsatisfactory conditions have been corrected.

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.

3.4 INSTALLATION

A. General: Install penetration firestopping systems in accordance with UL Fire Resistance Directory and 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.
   4. Seal all holes or voids made by penetrations to provide air and water resistant seal.

3.5 FIELD QUALITY CONTROL

A. Testing Services by Inspecting Agency: Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.
   1. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

B. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.

3.6 IDENTIFICATION AND DOCUMENTATION

A. Firestop contractor to supply documentation for each single application addressed. Identify each penetration and joint location installed on project.
   1. Documentation form for construction joints to include:
      a. Sequential Location Number.
      b. Project Name.
      c. Date of Installation.
      d. Detailed description of penetration location.
      e. Tested system or engineered judgment number.
      f. Type of construction joint.
      g. Width of joint.
      h. Lineal footage of joint.
      i. Number of sides addressed.
      j. Hourly rating to be achieved.
      k. Installer name.
   2. Provide copies to general contractor for project closeout documentation.

3.7 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Systems listed here are derived as Basis-of-Design systems. See Acceptable Manufacturers in Part 2 for accepted alternative approaches.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.

C. Designation System for Joints at the Intersection of Fire-Resistance-Rated Floor or Floor/Ceiling Assembly and an Exterior Curtain-Wall Assembly: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHDG:

D. Fire-stop Contractor to submit schedule to Architect for approval.

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SECTION 07 9200

JOINT SEALANTS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes sealants for the following applications, including those specified by reference to this Section:
   1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
      a. Control and expansion joints in brick and concrete unit masonry.
      b. Perimeter joints between materials listed above and frames of doors and windows.
      c. For control and expansion joints in precast concrete.
      d. Joints in metal panels.
      e. Joints in fiber cement wall panels, fascia boards, and trim boards at exterior.
      f. Joints in EIFS at exterior soffits.
      g. Joints in wall panels and fiber cement panels at exterior soffits.
      h. Other joints as indicated.
   2. Exterior joints in the following horizontal traffic surfaces per SUDAS:
      a. Control, expansion, and isolation joints in cast-in-place concrete slabs.
      b. Other joints as indicated.
   3. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Perimeter joints of exterior openings where indicated.
      c. Vertical control joints on exposed surfaces of interior unit masonry walls and partitions.
      d. Perimeter joints between interior wall surfaces and frames of interior doors, and windows.
      e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
      f. Other joints as indicated.
   4. Interior joints in the following horizontal traffic surfaces:
      a. Control and expansion joints in cast-in-place concrete slabs.
      b. Other joints as indicated.

1.2 PERFORMANCE REQUIREMENTS

A. Provide silicone and elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
   1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
   2. Conduct field tests for each application indicated below:
      a. Each kind of sealant and joint substrate is indicated.
   3. Notify Architect seven days in advance of dates and times when test joints will be

erected.

4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
    a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each product exposed to view.

C. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article. Ideally, testing results will be completed and ready for distribution at the pre-installation meeting.

1.5 CLOSEOUT SUBMITTALS

A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace silicone and elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
    1. Warranty Period: Two years from date of Substantial Completion.
    2. Warranty shall be clearly noted or highlighted.

C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish silicone and elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
    1. Warranty Period:
        a. Urethane: 5 years from date of Substantial Completion.
        b. Silicone: 20 years from date of Substantial Completion.
    2. Warranties shall be clearly noted or highlighted, with products used (listed above) called out.

D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
   1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance are caused by accumulation of dirt or other atmospheric contaminants.

1.6 QUALITY ASSURANCE

A. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials in compliance with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: 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.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

PART 2 PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified in the sealant schedules at the end of Part 3.

B. Acceptable Manufacturers - Sealants:
1. Master Builders Solutions, a division of BASF.
2. Dow Corning.
3. Pecora.
4. Sika.
5. Tremco.
6. United States Gypsum.
7. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range for this characteristic.

2.3 SILICONE AND ELASTOMERIC JOINT SEALANTS

A. Silicone and Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Silicone and Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.

B. Stain-Test-Response Characteristics: Where sealants are specified in the Silicone and Elastomeric Joint-Sealant Schedule to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

2.4 JOINT-SEALANT BACKING

A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
1. Closed cell polyethylene rod designed for use with cold applied joint sealants.

C. Silicone and Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26°F. Provide products with low compression set and

of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.

D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 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 sealants 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 with joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
   1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
   2. Clean, porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
      a. Concrete.
      b. Masonry.
      c. Unglazed surfaces of ceramic tile.
   3. Remove laitance and form-release agents from concrete.
   4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
      a. Metal.

b. Glass.
c. Glazed surfaces of ceramic tile.

B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and back of joints.

E. Install sealants by proven techniques to 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 provided for each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Non-sag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

A. Clean off excess sealants or sealants smears adjacent to joints as the Work progresses by

methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

3.6 ELASTOMERIC JOINT-SEALANT SCHEDULE

A. Listed Manufacturer's products are representative examples.

B. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

C. Sealant Type 1: Acoustical Sealant.
   1. Use: Electrical outlets and top/bottom partitions.
   2. ASTM C-919, one part acrylic latex equivalent to Tremco "Acoustical Sealant".

D. Sealant Type 2: Acrylic latex sealant.
   1. Use: Hollow metal interior frames abutting drywall (1/8-inch maximum joint) and interior windowsills.
   2. ASTM C834 for latex sealing compounds.
   3. Joint movement capability: ± 7.5%.
   4. Equivalent to Tremco “Tremflex 834" or BASF NP520.

E. Sealant Type 5: Silicone sealant.
   1. Use: Around plumbing fixtures and sinks.
   2. ASTM C920, Type S, Grade NS, Class 25, uses NT, G, A, O.
   3. Joint movement capability: ± 50%.
   4. Equivalent to Tremco “Tremsil 200".
   5. Color to match plumbing fixtures.

F. Sealant Type 6: Field tintable silicone sealant.
   1. Use: Exterior opening and penetrations.
   2. ASTM C-920, Type M, Grade NS, Class 50, uses NT, G, M, A, O.
   3. Joint movement capability: ± 50%.
   4. Equivalent to Tremco "Spectrem 3 or 4-TS" (Non-staining, low dirt pickup, and low sheen required).
      a. Provide Tremco “Spectrem 1” at HDPE and unexposed polyethylene conditions.
   5. Custom color may be required.

G. Sealant Type 8: High solid, non-skinning, non-drying, synthetic, butyl elastomer sealant.
   1. Use: Below door thresholds.
   2. Percent Solids: 90 to 92%.
   3. Equivalent to TremPro JS-773.
   4. Color: Standard off-white.

H. Backer Rod (typical use except Sealant Type 4).
   1. Provide closed-cell polyethylene rod designed for use with cold applied joint sealants.
   2. Provide backer rod of size required for joint design.

I. Joint Filler (used with Sealant Type 4).
   1. Provide closed-cell polyethylene joint filler designed for use with cold applied joint sealants.
   2. Provide joint filler of the size required for joint design.

J. Expanding Joint Seals: Silicone coated, ultraviolet resistant, watertight, primary wall seal with factory-applied adhesive on one side.
   1. Basis of Design: Sika Emseal “Seismic Colorseal”.
   2. Joint movement capability: ± 50% (total 100%) of nominal material size.
   3. Color: As selected by Architect.

K. Preformed Silicone Joint Seals: Manufacturer's standard seal consisting of precured low-modulus silicone extrusion, in sizes to fit applications indicated on Drawings, combined with a neutral-curing liquid silicone sealant for bonding seals to substrates.
   1. Basis of Design Product: Tremco, Inc.; Spectrem SimpleSeal.
   2. Shore A hardness ASTM D2240: 29-32.
   3. Tensile strength ASTM D412: 218 psi.
   4. Elongation at break ASTM D412: 554%.
   5. Movement classification ASTM C1523: Class 200%.
   6. Tear propagation classification ASTM C1523: PT (partial tear).

L. Color of sealants will be selected by the Architect from the manufacturer's full color range.

END OF SECTION

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Standard hollow metal doors and frames.
   2. Energy efficient hollow metal doors and frames.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Fire Rating Compliance: Submit independent test reports from an accredited, licensed agency documenting compliance with quality assurance requirements in Paragraph 1.4.

C. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

D. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.3 QUALITY ASSURANCE

A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure as close to neutral pressure as possible according to NFPA 252.
   1. Temperature-Rise Limit: provide doors that have a maximum transmitted temperature end point of not more than 450°F above ambient after 30 minutes of standard fire-test exposure.

B. Energy Efficient Exterior Openings: Comply with minimum thermal ratings, based on ASTM C1363. Openings to be fabricated and tested as fully operable, thermal insulating door and frame assemblies.
   1. Thermal Performance (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM C1363 and meet or exceed the following requirements:
      a. Door Assembly Operable U-Factor and R-Value Ratings: U-Factor 0.39, R-Value 2.54, including insulated door, thermal-break frame, and threshold.
   2. Air Infiltration (Exterior Openings): Independent testing laboratory certification for exterior door assemblies being tested in accordance with ASTM E283 to meet or exceed the following requirements:
      a. Rate of leakage of the door assembly shall not exceed 0.25 cfm per square foot of static differential air pressure of 1.567 psf (equivalent to 25 mph wind velocity).

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 the following:
   1. Allegion Republic.
   2. Ceco Door Products; an Assa Abloy Group company.
   3. Curries Company; an Assa Abloy Group company.
   4. Deansteel Manufacturing Company, Inc.
   5. Firedoor Corporation.
   6. Fleming Door Products Ltd.; an Assa Abloy Group company.
   7. Habersham Metal Products Company.
   8. Kewanee Corporation (The).
   9. Mesker Door Inc.
   10. Pioneer Industries, Inc.
   11. Security Metal Products Corp.
   12. Steelcraft; an Ingersoll-Rand company.
   13. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A60 metallic coating. Required for all exterior doors.

D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot dip galvanized according to ASTM A 153/A 153M, Class B.

E. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A 153/A 153M.

F. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

G. Mineral-Fiber Insulation: ASTM C 665, Type I.

H. Glazing: Division 08 Section "Glazing".

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat.

2.3 STANDARD HOLLOW METAL DOORS

A. General: Comply with ANSI/SDI A250.8.
   1. Design: Flush panel.
   2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene,

polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core. Where indicted provide doors fabricated as thermal-rated assemblies with a minimum R-value of 2.8 or better.
   a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
3. Vertical Edges for Single-Acting Doors: Latch: Beveled edge, 1/8-inch in 2 inches. Hinge: Square edge Manufacturer's standard.
4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch-thick, end closures or channels of same material as face sheets.
5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames".
6. Non-handed doors not allowed.

B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet, minimum thickness of 0.042-inch, with minimum A60 coating. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).
2. Thermal-Rated (Insulated) Doors: Operable U-Factor of 0.8 maximum in accordance with ASTM C1363.

C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush).

D. Hardware Reinforcement: ANSI/SDI A250.6.

E. Fire-Rated Doors Basis of Design: Labeled door to match required rating..
1. Approved manufacturers:
   a. Curries.
   b. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.4 ENERGY-EFFICIENT HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design specified, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8 and ANSI/NAAMM HMMA 867.

B. Energy Efficient Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model, ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.
1. Design: Flush panel.
2. Core Construction: steel stiffened in compliance with HMMA 867.
   a. Provide 22-gauge steel stiffeners at 6 inches on-center internally welded at 5 inches-on-center to integral core assembly.
   b. Thermal properties to rate at a fully operable minimum U-Factor 0.39 and R-Value 2.54, including insulated door, thermal-break frame, and threshold.
3. Level/Model: Level 3 and Physical Performance Level A (Heavy Duty), Minimum 16-gauge thick steel, Model 2.
4. Vertical Edges: Vertical edges to be mechanically interlocked with hairline seam. Beveled lock edge, 1/8-inch in 2 inches.
5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel

channel of not less than 16 gauge, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel, screw attached, with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.

6. Hinge Reinforcement: Minimum 7-gauge (3/16-inch) plate 1-1/4 inches x 9 inches.
7. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

C. Products:
   1. Curries Company 747 Steel Stiffened Door.
   2. Steelcraft Energy Efficient Steel Stiffened Doors.
   3. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.5 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8.

B. Exterior Frames: Fabricated from metallic-coated steel sheet, with minimum A60 coating.
   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as full profile weld.
   3. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.
   4. Minimum Thermal Performance: U-Factor of 0.8 maximum in accordance with ASTM C1363.

C. Interior Frames: Fabricated from cold-rolled steel sheet.
   1. Fabricate frames with mitered or coped corners.
   2. Fabricate frames as full profile welded unless otherwise indicated.
   3. Frames for Level 3 Steel Doors: 0.053-inch-thick steel sheet.
   4. Frames for Wood Doors: 0.053-inch-thick steel sheet.
   5. Frames for Borrowed Lights: Same as adjacent door frame.

D. Hardware Reinforcement: ANSI/SDI A250.6.

E. Fire Rated Frames: Fire resistive, temperature rise framing system rated for 120 minutes.
   1. Products:
      a. Safti First GPX Architectural Series Frame.
      b. Curries equivalent.
      c. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.6 ENERGY-EFFICIENT HOLLOW METAL FRAMES

A. Thermal Break Frames: Subject to the same compliance standards and requirements as standard hollow metal frames, provide where indicated thermally broken frame profiles available for use in both masonry and drywall construction. Fabricate from minimum 16-gauge galvannealed steel meeting ASTM 236.

2.7 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042-inch-thick, with corrugated or perforated straps not less than 2-inches-wide by 10-inches-long; or wire anchors not less than 0.177-inch-thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042-inch-thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, not less than 0.042-inch-thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2 inch height adjustment. Terminate bottom of frames at finish floor surface.

2.8 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032-inch-thick, same material as door face sheet.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8-inch-high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032-inch-thick, same material as frames.

2.9 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch-wide steel.

C. Grout Guards: Formed from same material as frames, not less than 0.016-inch-thick.

D. Spray-Foam Insulation:
1. Acceptable Products:
a. E84 Class 1 Fire Retardant Spray Foam Insulation as manufactured by Handi-Foam.
b. GacoFireStop 5500 is manufactured by Gaco Western.
c. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.10 FABRICATION

A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

B. Hollow Metal Doors:
1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Flush channel installation and seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
   1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
   2. Sidelight 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 butt welding.
   3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
   5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
   6. Jamb Anchors: Provide number and spacing of anchors as follows:
      a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Two anchors per jamb up to 60-inches-high.
         2) Three anchors per jamb from 60 inches to 90 inches high.
         3) Four anchors per jamb from 90 inches to 120 inches high.
         4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120-inches-high.
      b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Three anchors per jamb up to 60-inches-high.
         2) Four anchors per jamb from 60 inches to 90 inches high.
         3) Five anchors per jamb from 90 inches to 96 inches high.
         4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96-inches-high.
         5) Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
      c. Compression Type: Not less than two anchors in each jamb.
      d. Post-installed Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
   7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.
      a. Single-Door Frames: Three door silencers.
      b. Double-Door Frames: Two door silencers.

D. Hardware Preparation: Factories prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Door Hardware Specifications.
   1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
   2. Reinforce doors and frames to receive non-templated, mortised and surface-mounted door hardware.
   3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
   4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Electrical Sections.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
   1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
   2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each

glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on the inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.11 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 EXECUTION

3.1 INSTALLATION

A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
a. At fire-protection-rated openings, install frames according to NFPA 80.
b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
c. Install frames with removable glazing stops located on secure side of opening.
d. Install door silencers in frames before grouting.
e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
g. Field applies bituminous coating to backs of frames that are filled with grout containing anti-freezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
a. Floor anchors may be set with powder-actuated fasteners instead of post-installed expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
6. In-Place Concrete or Masonry Construction: Secure frames in place with post-installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Gypsum Board Partitions: Secure frames in place with post-installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to

other structural support at each jamb. Bend the top of struts to provide flush contact for securing supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    a. Squareness: ± 1/16-inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: ± 1/16-inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: ± 1/16-inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: ± 1/16-inch, measured at jambs at floor.
10. Grouting of hollow metal frames: All new hollow metal frames shall be fully grouted prior to installation.
    a. Fully coat the inside of the frame a bituminous mastic.
    b. Products: mortar grout cured by chemical reaction. Grout must have a maximum of 4 inch slump and be hand troweled in place. Temporary frame bracing may be required to prevent distortion of the frame while grouting.
    c. Install grout prior to installation in gypsum wall assembly. Do not install grout after installing the frame in a gypsum wallboard assembly as the liquid present in the grout may deteriorate the wallboard.
    d. Clean excess grout from the exposed faces of the hollow metal frame prior to painting/finishing.
    e. For exterior door frames, seal any gaps with spray foam insulation. Seal frame both sides with backer rod and sealant.

B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
    1. Non-Fire-Rated Standard Steel Doors:
        a. Jambs and Head: 1/8-inch ± 1/16-inch.
        b. Between Edges of Pairs of Doors: 1/8-inch ± 1/16-inch.
        c. Between Bottom of Door and Top of Threshold: Maximum 3/8-inch.
        d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4-inch.
    2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
    3. Smoke-Control Doors: Install doors according to NFPA 105.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
    1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. 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.

C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

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SECTION 08 1416

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Solid-core doors with wood-veneer faces.
   2. Factory finishing flush wood doors.
   3. Factory machining for hardware.

B. Related Sections:
   1. Division 08 "Glazing" for glass view panels in flush wood doors.

1.2 SUBMITTALS

A. Product Data: For each type of door indicated. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
   1. Indicate dimensions and locations of mortises and holes for hardware.
   2. Indicate dimensions and locations of cutouts.
   3. Indicate requirements for veneer matching.
   4. Indicate doors to be factory finished and finish requirements.
   5. Indicate fire-protection ratings for fire-rated doors.

C. Samples: For factory-finished doors.

1.3 CLOSEOUT SUBMITTALS

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Warping (bow, cup, or twist) more than 1/4-inch in a 42 inch by 84 inch section.
      b. Telegraphing of core construction in face veneers exceeding 0.01-inch in a 3 inch span.
   2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
   3. Warranty Period for Solid-Core Interior Doors: Life of installation.
   4. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

A. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated".

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. VT Industries Inc.
   2. Forte Opening Solutions (Basis of Design).
   3. Forte Opening Solutions.
   4. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 DOOR CONSTRUCTION, GENERAL

A. WDMA I.S.1-A Performance Grade:
   1. Heavy Duty unless otherwise indicated.

B. Particleboard-Core Doors:
   1. Particleboard: ANSI A208.1, Grade 1-LD-2.
   2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
   3. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

C. Mineral-Core Doors:
   1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
   2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
   3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:
   1. Grade: Premium, with Grade A faces.
   2. Species: White Maple.
   3. Cut: Plain sliced (flat sliced).
   4. Match between Veneer Leaves: Book match.
   5. Assembly of Veneer Leaves on Door Faces: Balance match.
   6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
   7. Core: Particleboard.
   8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES

A. Wood Frames for Lite Openings:
   1. Architectural Woodwork Standards Grade: Premium.
   2. Wood Species and Cut: Match species and cut indicated for wood doors unless

otherwise noted.
3. Wood Moisture Content: 5 to 10 percent.
4. Profile: Straight.

2.5 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
   1. Comply with requirements in NFPA 80 for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Openings: Cut and trim openings through doors in factory.
   1. Light Openings: Trim openings with moldings of material and profile indicated.
   2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing".

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Finish doors at factory that are indicated to receive transparent finish.

C. Transparent Finish:
   1. Grade: Premium.
   2. Finish: WDMA TR-6 catalyzed polyurethane.
   3. Staining: Cocoa Bean; custom stain to match as required to match architect sample.
   4. Effect: Open-grain finish.
   5. Sheen: Satin.

2.7 FACTORY PRIMING

A. Doors for Opaque Finish: Factory prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 09 9000 “Painting and Coating”.

PART 3 EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Division 08 - "Door Hardware".

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
   1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails more than limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
   1. Clearances: Provide 1/8-inch at heads, jambs, and between pairs of doors. Provide 3/4-inch from bottom of door to top of floor slab unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4-inch from bottom of door to top of threshold unless otherwise indicated.
      a. Comply with NFPA 80 for fire-rated doors.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION

SECTION 08 3113

ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes access doors and frames for walls and ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of access door and frame indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

1.3 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.
   1. See Drawings for size and locations.

PART 2 PRODUCTS

2.1 STEEL MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
   1. ASTM A 123/A 123M, for galvanizing steel and iron products.
   2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
   1. ASTM A 123/A 123M, for galvanizing steel and iron products.
   2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

C. Steel Sheet: electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with A60 zinc-iron-alloy (galvannealed) coating or G60 mill-phosphatized zinc coating.

E. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Factory-Primed Finish: Manufacturer's standard shop primer.
   2. Baked-Enamel Finish: Minimum dry film thickness of 2 mils.
   3. Powder-Coat Finish: Thickness not less than 1.5 mils.

F. Drywall Beads: 0.0299-inch zinc-coated steel sheet to receive joint compound.

G. Plaster Beads: 0.0299-inch zinc-coated steel sheet with flange of expanded metal lath.

H. Manufacturer's standard finish.

2.2 ALUMINUM MATERIALS

A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6, mill finish.

B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6, mill finish.

C. Aluminum Sheet: ASTM B 209.
   1. Mill finish.
   2. Anodic Finish: Class I, clear anodic coating complying with AAMA 611-12.
   3. Baked-Enamel Finish: Manufacturer's standard.

2.3 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Basis of Design: Provide access hatch from one of the following manufacturers, in all locations indicated on drawings.
      a. Sizes as indicated on drawings.
      b. Trim - to be flanged to cover edge of drywall.
   2. Acudor Products, Inc.
   3. Babcock-Davis; A Cierra Products Co.
   4. Milcor Inc.
   5. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Aluminum Flush Access Doors and Frames with Exposed Trim: Fabricated from aluminum sheet and extruded-aluminum shapes.
   1. Locations:
   2. Door: Minimum 0.080-inch-thick aluminum sheet.
   3. Frame: Minimum 0.060-inch-thick extruded aluminum with 1-1/4-inch-wide rolled flange.
   4. Hinges: Concealed continuous aluminum.
   5. Latch: Screwdriver-operated cam latch.

2.4 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, provide materials with smooth, flat surfaces without blemishes.

C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.

E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
   1. For cylinder lock, furnish two keys per lock and key all locks alike.
   2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.

F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

PART 3 EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.

C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING AND CLEANING

A. Adjust doors and hardware after installation for proper operation.

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

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SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Exterior and Vestibule storefront framing.
   2. Exterior and Vestibule manual-swing entrance doors and door frame units.

1.2 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, storm drift and deflection from uniformly distributed and concentrated live loads.
   2. Dimensional tolerances of building frame and other adjacent construction.
   3. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Noise or vibration created by wind and by thermal and structural movements.
      e. Loosening or weakening of fasteners, attachments, and other components.
      f. Failure of operating units.

B. Wind Loads: As indicated on drawings.

C. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated, including anchoring analysis.

D. Deflection of Framing Members:
   1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4-inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4-inch, whichever is less.
   2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8-inch, whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
   1. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   2. Test Durations: 10 seconds.

F. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft.

G. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include product test reports.

B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
   1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
   2. Include product test results.

C. Samples: For each type of exposed finish required. Include product test reports.

D. Other Action Submittals:
   1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication, and assembly of entrance door hardware, as well as procedures and diagrams.

E. Delegated-Design Submittal: For aluminum-framed systems 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 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

C. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: Five years from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.

C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer. If curtainwall is included in the Scope of Work, curtainwall must be from same manufacturer.

F. Pre-Installation Meeting: Conduct meetingat Project site.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Product: EFCO Storefront System 401 2 inch x 4 1/2-inch Storefront Framing.
   1. Minimum Thermal Performance: Maximum operable U-Factor of system to be 0.80 (BTU/h*ft²*˚F) in accordance with ASTM C1363.

B. Other Approved Manufacturer.
   1. Kawneer North America; an Alcoa company.
   2. Oldcastle Building Envelope.
   3. Pittco Architectural Metals.
   4. Tubelite.
   5. United States Aluminum.
   6. Wausau.
   7. YKK America.
   8. Substitutions allowed in accordance with Division 00 & 01 Specifications.

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
   1. Sheet and Plate: ASTM B 209.
   2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
   3. Extruded Structural Pipe and Tubes: ASTM B 429.
   4. Structural Profiles: ASTM B 308/B 308M.
   5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
   1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
   3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Interior Vestibule: EFCO System 401.
      a. Face Size: 2 inch minimum.
      b. Depth: Manufacturer’s standard to meet performance requirements and drawing requirements. 4-1/2 inch minimum.
   2. Exterior: EFCO System 406.
      a. Face Size: 2 inch minimum.
      b. Depth: Manufacturer’s standard to meet performance requirements and drawing requirements. 6 inch minimum.
   3. Construction: Thermally improved; thermally broken.
   4. Glazing System: Retained mechanically with gaskets on four sides.
   5. Glazing Plane: Front.
   6. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
   1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
   2. Reinforce members as required to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from stainless steel.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials of type recommended by manufacturer 0.040 aluminum.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
   1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.4 GLAZING SYSTEMS

A. Glazing: As specified in Division 08 Section "Glazing".

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type. Contractor’s option to use Quanex Building Products “Super Spacer” Structural Foam Spacer system as an alternative to aluminum spacers.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.5 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
   1. Product: EFCO Series D502(TS).
      a. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.
   2. Door Construction: 2 inch overall thickness, with minimum 0.125-inch-thick confirm matches Basis of Design, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
   3. Door Design: Wide stile; 5 inch nominal width.
      a. Accessible Doors: Smooth surfaced for width of door in area within 8 inches above floor or ground plane.
   4. Glazing Stops and Gaskets: Square, Snap-On, extruded-aluminum stops and preformed gaskets.
      a. Provide nonremovable glazing stops on outside of door.

2.6 ENTRANCE DOOR HARDWARE

A. General: Refer to Division 08 Door Hardware sections for requirements for aluminum entrance door system door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.
   1. Entrance Door Hardware Sets: Provide quantity, item, size, finish, or color indicated.
   2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
   3. Opening-Force Requirements:
      a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
      b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

2.7 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil thickness per coat.

B. Weather Barrier: Flexible silicone sheet to gap joints in between windows and building structure.
   1. Basis of Design: Zialoc Silicone Weather Seal. Performance requirements:
      a. Tensile Strength: 1,000 psi minimum.
      b. Elongation Minimum: 400%.
      c. Compression Set Maximum: 15%.
      d. Tear Resistance Minimum: 90 PPI.
      e. Low Temperature Brittle Point: -80°F.

f. High Temperature Service Rang: 400°F Continuous, 500°F Intermittent.
g. Flammability Rating: UL94 HB.

2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.
5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from exterior and interior.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611-12, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
1. Color: Black.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:
1. Comply with manufacturer's written instructions.
2. Do not install damaged components.

3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
6. Seal joints watertight unless otherwise indicated.

B. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 07 9200 "Joint Sealants" to produce weathertight installation.

E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

F. Install glazing as specified in Division 08 Section "Glazing".

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

END OF SECTION

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SECTION 08 7100

DOOR HARDWARE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 00 & 01 Specifications, apply to this Section.

1.2 SUMMARY

A. This Section includes commercial door hardware for the following:
   1. Swinging doors.
   2. Other doors to the extent indicated.

B. Door hardware includes, but is not necessarily limited to, the following:
   1. Mechanical door hardware.
   2. Electromechanical door hardware.
   3. Automatic operators.
   4. Cylinders specified for doors in other sections.

C. Related Sections:
   1. Division 01 Specifications.
   2. Division 06 Section “Miscellaneous Rough Carpentry”.
   3. Division 08 Section “Hollow Metal Doors and Frames”.
   4. Division 08 Section “Flush Wood Doors”.
   5. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
   6. Division 26 Sections for Electrical.

D. Codes and References: Comply with the version adopted by the Authority Having Jurisdiction.
   1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
   2. ICC/IBC - International Building Code.
   3. NFPA 70 - National Electrical Code.
   4. NFPA 80 - Fire Doors and Windows.
   5. NFPA 101 - Life Safety Code.
   6. NFPA 105 - Installation of Smoke Door Assemblies.
   7. UL/ULC and CSA C22.2 - Standards for Automatic Door Operators Used on Fire and Smoke Barrier Doors and Systems of Doors.
   8. State Building Codes, Local Amendments.

E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
   1. ANSI/BHMA Certified Product Standards - A156 Series.
   2. UL10C - Positive Pressure Fire Tests of Door Assemblies.
   3. ANSI/UL 294 - Access Control System Units.
   4. UL 305 - Panic Hardware.
   5. ANSI/UL 437- Key Locks.

1.3 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing, fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule".
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets in Section 08 87100.01 "Door Hardware Schedule". Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Manufacturer of each item.
      c. Fastenings and other pertinent information.
      d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
      e. Explanation of abbreviations, symbols, and codes contained in schedule.
      f. Mounting locations for door hardware.
      g. Door and frame sizes and materials.
      h. Warranty information for each product.
   4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

C. Shop Drawings: Details of electrified access control hardware indicating the following:
   1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
      a. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
      b. Complete (risers, point-to-point) access control system block wiring diagrams.
      c. Wiring instructions for each electronic component scheduled herein.
   2. Electrical Coordination: Coordinate with related sections the voltages and wiring details required at electrically controlled and operated hardware openings.

D. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

E. Informational Submittals:
   1. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

1.4 CLOSEOUT SUBMITTALS

A. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01 Specifications.

B. Project Record Documents: Provide record documentation of as-built door hardware sets in digital format (.pdf,.docx,.xlsx,.csv) and as required in Division 01 Specifications.

C. General Warranty: Reference Division 01 Specifications. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor(s) under requirements of the Contract Documents.

D. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
   1. Structural failures including excessive deflection, cracking, or breakage.
   2. Faulty operation of the hardware.
   3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
   4. Electrical component defects and failures within the systems operation.

E. Warranty Period: Unless otherwise indicated, warranty shall be one year from date of Substantial Completion.

1.5 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).

C. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
   1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
   2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

D. Each unit to bear third party permanent label indicating compliance with the referenced testing standards.

E. Keying Conference: Conduct conference to comply with requirements in Division 01 Specifications. Keying conference to incorporate the following criteria into the final keying schedule document:
   1. Function of building, purpose of each area and degree of security required.
   2. Plans for existing and future key system expansion.
   3. Requirements for key control storage and software.
   4. Installation of permanent keys, cylinder cores and software.
   5. Address and requirements for delivery of keys.

F. Pre-Submittal Meeting: Conduct coordination meeting in compliance with requirements in Division 01 Specifications with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
   1. Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
   2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
   3. Review sequence of operation narratives for each unique access controlled opening.
   4. Review and finalize construction schedule and verify availability of materials.
   5. Review the required inspecting, testing, commissioning, and demonstration procedures.

G. At completion of installation, provide written documentation that components were applied according to manufacturer's instructions and recommendations and according to approved schedule.

1.6 DELIVERY, STORAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Meeting".

1.7 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

PART 2 PRODUCTS

2.1 MATERIALS

A. Hardware shall not have any visible manufacturer names on exposed materials, except cylinders, when the door is in a closed position.

B. Substitutions for all Door Hardware listed below: Allowed in accordance with Division 00 & 01 Specifications.

2.2 BUTT HINGES

A. Hinges: ANSI/BHMA A156.1 butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
   1. Quantity: Provide the following hinge quantity:
      a. Two Hinges: For doors with heights up to 60 inches.
      b. Three Hinges: For doors with heights 61 to 90 inches.
      c. Four Hinges: For doors with heights 91 to 120 inches.
      d. For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.
   2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
      a. Widths up to 3’0”: 4-1/2” standard or heavy weight as specified.
      b. Sizes from 3’1” to 4’0”: 5” standard or heavy weight as specified.
   3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
      a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
      b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
   4. Hinge Options: Comply with the following:
      a. Non-removable Pins: With the exception of electric through wire hinges, provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for all out-swinging lockable doors.
   5. Manufacturers:
      a. Hager Companies (HA) - BB Series, 5-knuckle.
      b. McKinney (MK) - TA/T4A Series, 5-knuckle.

2.3 CONTINUOUS HINGES

A. Continuous Geared Hinges: ANSI/BHMA A156.26 Grade 1-600 continuous geared hinge. with minimum 0.120-inch-thick extruded 6063-T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Factory trim hinges to suit door height and prepare for electrical cut-outs.
   1. Manufacturers:
      a. Hager Companies (HA).
      b. Pemko (PE).

2.4 POWER TRANSFER DEVICES

A. Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
   1. Manufacturers:
      a. Pemko (PE) - EL-CEPT Series.
      b. Securitron (SU) - EL-CEPT Series.

B. Electric Door Wire Harnesses: Provide electric/data transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number and type of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
   1. Provide one each of the following tools as part of the base bid contract:
      a. McKinney (MK) - Electrical Connecting Kit: QC-R001.
      b. McKinney (MK) - Connector Hand Tool: QC-R003.
   2. Manufacturers:
      a. McKinney (MK) - QC-C Series.
      b. Schlage (SC) - Connect.

2.5 DOOR OPERATING TRIM

A. Door Push Plates and Pulls: ANSI/BHMA A156.6 door pushes and pull units of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
   1. Push/Pull Plates: Minimum 0.050-inch-thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.
   2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
   3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
   4. Pulls shall be provided with a 10” clearance from the finished floor on the push side to accommodate wheelchair accessibility.
   5. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets. When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.
   6. Manufacturers:
      a. Rockwood (RO).
      b. Trimco (TC).

2.6 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
   1. Manufacturers:
      a. Sargent Manufacturing (SA).

B. Cylinder Types: Original manufacturer cylinders able to supply the following cylinder formats and types:
   1. Threaded mortise cylinders with rings and cams to suit hardware application.
   2. Rim cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
   3. Bored or cylindrical lock cylinders with tailpieces as required to suit locks.
   4. Tubular deadlocks and other auxiliary locks.
   5. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
   6. Keyway: Manufacturer’s Standard.

C. Keying System: Each type of lock and cylinders to be factory keyed.
   1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
   2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
   3. New System: Key locks to a new key system as directed by the Owner.

D. Key Quantity: Provide the following minimum number of keys:
   1. Change Keys per Cylinder: Two (2).
   2. Master Keys (per Master Key Level/Group): Five (5).
   3. Construction Keys (where required): Ten (10).

E. Construction Keying: Provide construction master keyed cylinders.

F. Key Registration List (Bitting List):
   1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
   2. Provide transcript list in writing or electronic file as directed by the Owner.

2.7 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.
   1. Manufacturers:
      a. Lund Equipment (LU).
      b. MMF Industries (MM).
      c. Telkee (TK).

2.8 MORTISE LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): Provide ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed mortise locksets. Listed manufacturers shall meet all functions and features as specified herein.
   1. Electromechanical locksets shall have the following functions and features:
      a. Universal Molex plug-in connectors that have standardized color-coded wiring and are available in fail safe or fail secure and operate from 12vdc to 24vdc regulated.
      b. EcoFlex or equivalent technology that reduces energy consumption up to 92% as certified by GreenCircle.
      c. Motorized electric latch retraction where the latchbolt retracts in 0.5 seconds of power being applied; removing power allows the latch to project back to the extended position. Motorized latch retraction force exceeds ANSI/BHMA 50 lbs. warped door test.
      d. Options to be available for request-to-exit or enter signaling, latchbolt and deadbolt monitoring.
      e. Two-year limited warranty on electrified functions.
   2. Manufacturers:
      a. Corbin Russwin Hardware (RU) - ML2000 Series.
      b. Sargent Manufacturing (SA) - 8200 Series.
      c. Schlage (SC) - L9000 Series.

2.9 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
   1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
   2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
   3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
   4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:
   1. Strikes for Mortise Locks and Latches: BHMA A156.13.
   2. Strikes for Bored Locks and Latches: BHMA A156.2.
   3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
   4. Dustproof Strikes: BHMA A156.16.

2.10 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:
   1. Exit devices shall have a five-year warranty.
   2. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
   3. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the

proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

4. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
5. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
6. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
    a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
    b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
7. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
8. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
9. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
10. Rail Sizing: Provide exit device rails factory sized for proper door width application.
11. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed exit devices. Listed manufacturers shall meet all functions and features as specified herein.
    1. Provide exit devices with functions and features as follows:
        a. Where required by code, provide knurling or abrasive coating on all levers leading to hazardous areas.
        b. Meets UL and CUL Standard 10C Positive Pressure, Fire Test of Door Assemblies with levers that meet A117.1 Accessibility Code.
        c. No catch points: addition of applied deflectors or other added components are not allowed.
        d. No visible plastic.
        e. Heavy duty end caps with flush and overlapping options made of stainless steel, brass, or bronze with architectural finishes.
        f. Constructed of all stainless steel.
        g. Stainless steel pullman type latch with deadlock feature.
        h. Narrow or wide style exterior trim as specified in the hardware sets.
        i. Center case adjustability on concealed vertical rod exit devices; single operation with hex key individually adjusts top or bottom latches. No retainer screws or clips required to maintain adjustment.
        j. Ten-year limited warranty for mechanical features.
    2. Manufacturers:
        a. Corbin Russwin Hardware (RU) - PED4000 / PED5000 Series.
        b. Sargent Manufacturing (SA) - PE80 Series.
        c. Von Duprin (VD) - 35A/98 XP Series.

2.11 SURFACE DOOR CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:
    1. General: Door closers to be from one manufacturer, matching in design and style, with

the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.

2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.

B. Door Closers, Surface Mounted (Large Body Cast Iron): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control.
   1. Large body cast iron surface mounted door closers shall have a 30-year warranty.
   2. Manufacturers:
      a. Corbin Russwin Hardware (RU) - DC8000 Series.
      b. LCN Closers (LC) - 4040XP Series.
      c. Sargent Manufacturing (SA) - 281 Series.

2.12 ELECTROHYDRAULIC DOOR OPERATORS

A. Electrohydraulic Door Operators (High Traffic): Provide ANSI/BHMA A156.19 Certified Products Directory (CPD) listed low energy operators that meet ANSI/BHMA A156.4 requirements and are UL listed for use on fire rated doors and UL10C certified that comply with requirements for the Americans with Disabilities Act (ADA). Operators shall be verified by GreenCircle to offer energy savings of 19% when compared to similar products to accommodate openings up 250 pounds and 48” wide. Provide accessories such as custom templates, special mounting brackets, spacers and drop plates as needed for proper installation. Operators shall accommodate openings up to 200 pounds and 48” wide. Listed manufacturers shall meet all functions and features as specified herein.
   1. Provide operators with features as follows:
      a. Non-handed with push and pull side mounting.
      b. Operates as mechanical surface closer during close cycles, when door is opened manually or if power is off.
      c. Activation by push button, hands-free or radio frequency devices.
      d. On board electronics to collect usage and cycle count data to facilitate preventative maintenance/diagnostics.
      e. Two-year limited warranty.
      f. Wi-Fi interface where the operator is a secure, password protected WiFi hot spot with no connection to building’s IT required.
         1) Simple setup with no app required.
         2) View status and make adjustments without removing the cover.
         3) Built-in logic to support single use restroom applications with no external relay

boards, logic modules, position switches required.
g. Mounting backplate to simplify and speed up installation.
2. Operators shall have the following functionality:
a. Adjustable Hold Open: Amount of time a door will stay in the full open position after an activation.
b. Blow Open for Smoke Ventilation: Door opens when signal is received from alarm system allowing air or smoke to flow through opening. Door will stay open until signal from alarm system is stopped.
c. Infinite Hold Open: Door will hold open at set position until power is turned off.
d. Obstruction Detection: Door closes if it hits an obstruction while opening; door will reverse to open position if it hits an obstruction while closing. Door will stop once it hits an obstruction and will rest against the obstruction until removed.
e. Open Delay: Delays operator opening for locking hardware.
f. Overload Safety Shut-Off: After two minutes of receiving a door activation signal, inverter times out and door closes to prevent motor/inverter damage.
g. Presence Detector Input: Input for external sensor to detect presence at door open or close position only.
h. Push & Go: As the door is manually opened, the operator "senses" movement and opens door to the full-open position.
i. Selector Mode Switch: Off disables the signal inputs unless Blow Open is activated, on activates the signal inputs, hold open activates the unit (unless Blow Closed is activated) to the hold open position.
j. Vestibule Delay: When the wall switch is pressed, first door in vestibule will open. Second door will open once vestibule door delay has expired. Delay is adjustable.
3. Manufacturers:
a. LCN (LC) - 4630/4640 Series.
b. Norton Rixson (NO) - 6000 Series.

2.13 ARCHITECTURAL TRIM AND ACCESSORIES

A. Door, Frame and Wall Protective Trim: ANSI/BHMA A156.6, protective products as specified in the hardware sets. Door protection plates shall be not more than 2" less than door width on stop side and 1” less door width on the pull side or on stop side of pairs of doors. Listed manufacturers shall meet all functions and features as specified herein.
1. Provide protective trim with functions and features as follows:
a. Meets ADA requirements for smooth bottom door surfaces.
b. UL Classified options for use on fire-rated doors up to 3 hours.
c. Fabricated from stainless steel, brass, bronze, aluminum, or high-impact plastic.
d. Available in a variety of sizes, finishes, and profiles to suit aesthetic and functional requirements.
e. Designed to protect doors, frames, and adjacent walls from damage due to impact, abrasion, or traffic.
f. Fasteners included; adhesive-backed options available for select models.
g. Ten-year limited warranty.
2. Manufacturers:
a. Rockwood (RO).
b. Trimco (TC).

2.14 DOORSTOPS AND HOLDERS

A. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of doorstops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
   1. Manufacturers:
      a. Rockwood (RO).
      b. Trimco (TC).

B. Overhead Doorstops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
   1. Manufacturers:
      a. dormakaba (DO).
      b. Norton Rixson (NO).
      c. Sargent Manufacturing (SA).

2.15 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
   1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.

C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
   1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NFPA 252, Standard Methods of Fire Tests of Door Assemblies.

D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.

E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

F. Manufacturers:
   1. Pemko (PE).
   2. Reese Enterprises, Inc. (RE).

2.16 ELECTRONIC ACCESSORIES

A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
   1. Manufacturers:
      a. Alarm Controls (AK) - CP1-1026 Series.
      b. Securitron (SU) - DPS Series.

B. Switching Power Supplies: Provide the least number of power supplies at the appropriate amperage level sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
   1. Manufacturers:
      a. Altronix (AS) - Maximal 3.
      b. Life Safety Power (LP).
      c. Securitron (SU) - AQD Series.

2.17 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.18 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
   1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
   1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames”.
   2. DHI TDH-007-20: Installation Guide for Doors and Hardware.
   3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities”.
   4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

C. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

D. Push Plates and Door Pulls: When through-bolt fasteners are in the same location as a push plate, countersink the fasteners flush with the door face allowing the push plate to sit flat against the door.

E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants”.

F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection (Punch Report): Reference Division 01 Specifications. Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
   1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

B. Clean adjacent surfaces soiled by door hardware installation.

C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   1. Quantities listed are for each pair of doors, or for each single door.
   2. The supplier is responsible for handing and sizing all products.
   3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
   4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. See Section 08 7100.01 "Door Hardware Schedule".

END OF SECTION

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SECTION 08 7100.01

DOOR HARDWARE SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes commercial door hardware schedule.

1.2 CLOSEOUT SUBMITTALS

A. See Section 08 7100 “Door Hardware”.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.1 DOOR HARDWARE SETS AND SCHEDULE

A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
   1. Quantities listed are for each pair of doors, or for each single door.
   2. The supplier is responsible for handing and sizing all products.
   3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
   4. At existing openings with new hardware the supplier shall field inspect existing conditions prior to the submittal stage to verify the specified hardware will work as required. Provide alternate solutions and proposals as needed.

B. Substitutions for all Door Hardware listed below: Allowed in accordance with Division 00 & 01 Specifications.

C. Manufacturer’s Abbreviations:
   1. MK - McKinney
   2. PE - Pemko
   3. SU - Securitron
   4. SA - SARGENT
   5. RO - Rockwood
   6. NO - Norton Rixson
   7. OT – Other

Hardware Sets				
Set: 1.0				
Doors: 118				
1	Continuous Hinge	KBSPFMxxxHD1 PT		PE
1	Electric Power Transfer	EL-CEPT	BSP	SU
1	Nightlatch Rim Exit Device	53 55 56 PE8504 LESS PULL	US32D	SA
1	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Sargent Spacer Block Kit	581-2 (AS REQUIRED)	EN	SA
1	Parallel Heavy Duty Arm Surface Closer	281 P10	EN	SA
1	Sargent Drop Plate	281D (AS REQUIRED)	EN	SA
1	Sweep	3452ANB		PE
1	Threshold	253x3AFG		PE
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Exit Device)		MK
1	Position Switch	DPS-M / W		SU
1	Power Supply	AQL SERIES (BY AMPERAGE REQUIRED)		SU
1	Gasketing	PROVIDED BY ALUMINUM DOOR MANUFACTURER		OT
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Door normally closed, latched and secured. Entry by valid card read or key override. Free egress at all times.				

Set: 2.0				
Doors: 100A				
1	Continuous Hinge	KBSPFMxxxHD1 PT		PE
1	Electric Power Transfer	EL-CEPT	BSP	SU
1	Rim Exit Device	53 55 56 PE8510 EO	US32D	SA
1	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Automatic Opener (SINGLE)	6000 SERIES	689	NO
1	Sweep	3452ANB		PE
1	Threshold	253x3AFG		PE
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Exit Device)		MK
1	Position Switch	DPS-M / W		SU
2	Door Switch	501		NO
1	Power Supply	AQL SERIES (BY AMPERAGE REQUIRED)		SU
1	Gasketing	PROVIDED BY ALUMINUM DOOR MANUFACTURER		OT
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Doors unlocked / Locked by card reader or timer per owners instructions. Timer to be furnished by access control supplier. Secure side actuator only active when doors are electrically unlocked. Non secure side actuator active at all times, but latch to retract before door opens. Wiring by electrical contractor. Latchbolt monitoring and crossbar monitoring wired to access control system by access control supplier. Wiring of door position switch by access control supplier.				

Set: 2.1				
Doors: 100B				
1	Continuous Hinge	KBSPFMxxxHD1 PT		PE
1	Electric Power Transfer	EL-CEPT	BSP	SU
1	Rim Exit Device	53 55 56 PE8510 EO	US32D	SA
1	Cylinder and Housing	X Type Required		SA
1	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Automatic Opener (SINGLE)	6000 SERIES	689	NO
1	Sweep	3452ANB		PE
1	Threshold	253x3AFG		PE
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Exit Device)		MK
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	Position Switch	DPS-M / W		SU
2	Door Switch	501		NO
1	Power Supply	AQL SERIES (BY AMPERAGE REQUIRED)		SU
1	Gasketing	PROVIDED BY ALUMINUM DOOR MANUFACTURER		OT
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Doors unlocked / Locked by timer per owners instructions. Timer to be furnished by access control supplier. Secure side actuator only active when doors are electrically unlocked. Non secure side actuator active at all times, but latch to retract before door opens. Wiring by electrical contractor. Latchbolt monitoring and crossbar monitoring wired to access control system by access control supplier. Wiring of door position switch by access control supplier.				

Set: 3.0				
Doors: 117				
1	Continuous Hinge	CFMxxxHD1 PT		PE
1	Electric Power Transfer	EL-CEPT	630	SU
1	Storeroom/Closet Lock	LX 8204 LNL	US26D	SA
1	Surface Overhead Holder/Stop	9-X36	689	NO
1	Parallel Rigid Offset Arm Surface Closer	281 PD10	EN	SA
1	Kick Plate	K1050 10" X 2" LDW CSK BEV	US32D	RO
1	Gasketing	2891APK		PE
1	Sweep	3452ANB		PE
1	Threshold	253x3AFG		PE
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Lock)		MK
1	Position Switch	DPS-M / W		SU
1	Power Supply	AQL SERIES (BY AMPERAGE REQUIRED)		SU
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Door normally closed, latched and secured. Entry by key override. Free egress at all times. Door monitored for status only. Install gasketing prior to soffit mounted hardware. Do not notch gasketing for soffit mounted hardware.				

Set: 4.0				
Doors: 101B				
3	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Storeroom Rim Exit Device	55 56 PE8806 WEL	US32D	SA
1	Parallel Heavy Duty Arm Surface Closer	281 P10	EN	SA
1	Kick Plate	K1050 10" X 2" LDW CSK BEV	US32D	RO
1	Wall Stop	400	US26D	RO
3	Silencer	608/609 RKW		RO
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Exit Device)		MK
1	Position Switch	DPS-M / W		SU
1	Power Supply	AQL SERIES (BY AMPERAGE REQUIRED)		SU
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Door normally closed, latched and secured. Entry by valid card read or key override. Free egress at all times.				

Set: 5.0				
Doors: 101A				
3	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Storeroom Rim Exit Device	55 56 PE8806 WEL	US32D	SA
1	Parallel Heavy Duty W/ Stop Arm Surface Closer	281 CPS	EN	SA
1	Kick Plate	K1050 10" X 2" LDW CSK BEV	US32D	RO
1	Wall Stop	400	US26D	RO
3	Silencer	608/609 RKW		RO
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Exit Device)		MK
1	Position Switch	DPS-M / W		SU
1	Power Supply	AQL SERIES (BY AMPERAGE REQUIRED)		SU
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Door normally closed, latched and secured. Entry by valid card read or key override. Free egress at all times.				

Set: 6.0				
Doors: 100C, 100D				
1	Continuous Hinge	KBSPFMxxxHD1		PE
1	Push Bar	PE8893	US32D	SA
1	Offset Pull	RM201 Mtg-Type 1XHD	US32D	RO
1	Automatic Opener (SINGLE)	6000 SERIES	689	NO
2	Door Switch	501		NO
1	Gasketing	PROVIDED BY ALUMINUM DOOR MANUFACTURER		OT

Set: 7.0				
Doors: 134				
3	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Electric Power Transfer	EL-CEPT	630	SU
1	Storeroom/Closet Lock	RX 56 8204 LNL	US26D	SA
1	Standard Surface Closer	281 O	EN	SA
1	Kick Plate	K1050 10" X 2" LDW CSK BEV	US32D	RO
1	Wall Stop	400	US26D	RO
3	Silencer	608/609 RKW		RO
1	ElectroLynx Harness	QC-C1500P (Frame - EPT to Power/Controller)		MK
1	Card Reader	BY SECURITY CONTRACTOR		OT
1	ElectroLynx Harness	QC-CxxxP (Door - EPT to Elec. Lock)		MK
1	Position Switch	DPS-M / W		SU
1	Power Supply	AQD SERIES (BY AMPERAGE REQUIRED)		SU
1	Wiring Diagram	ELEVATION AND POINT TO POINT AS SPECIFIED		OT
Notes: Door normally closed, latched and secured. Entry valid card read or by key override. Free egress at all times.				

Set: 8.0				
Doors: 116, 137, 144A, 144B, 231, 237, 238, 239				
3	Hinge, Full Mortise	TA2714-MCK 4-1/2" x 4-1/2"	US26D	MK
1	Storeroom/Closet Lock	8204 LNL	US26D	SA
1	Wall Stop	400	US26D	RO
3	Silencer	608/609 RKW		RO

Set: 9.0				
Doors: 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128A, 128B, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 217, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228				
3	Hinge, Full Mortise	TA2714-MCK 4-1/2" x 4-1/2"	US26D	MK
1	Office/Entry Lock	8205 LNL	US26D	SA
1	Wall Stop	400	US26D	RO
3	Silencer	608/609 RKW		RO

Set: 10.0				
Doors: 102, 103, 135, 136, 232, 233, 234, 235				
3	Hinge, Full Mortise, Hvy Wt	T4A3786 4-1/2" x 4-1/2"	US26D	MK
1	Privacy Lock w/ Indicator	V21 EMB 8265 LNL	US26D	SA
1	Standard Surface Closer	281 O	EN	SA
1	Kick Plate	K1050 10" X 2" LDW CSK BEV	US32D	RO
1	Wall Stop	400	US26D	RO
1	Gasketing	S88BL		PE
1	Coat Hook	RM820	US32D	RO

Set: 11.0				
Doors: 130, 131, 132, 133A, 133B, 138, 139, 229A, 229B, 230, 236				
3	Hinge, Full Mortise	TA2714-MCK 4-1/2" x 4-1/2"	US26D	MK
1	Passage Latch	8215 LNL	US26D	SA
1	Wall Stop	400	US26D	RO
3	Silencer	608/609 RKW		RO

END OF SECTION

SECTION 08 8000

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Exterior windows and entrances.
   2. Interior windows and glazed openings.

1.2 DEFINITIONS

A. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

B. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

C. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

D. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.3 PERFORMANCE REQUIREMENTS

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thickness by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
   1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:

a. Specified Design Wind Loads: not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads".

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120°F, ambient; 180°F, material surfaces.

D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
1. For monolithic glass lites, properties are based on units with lites 6.0-mm-thick.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite 6.0-mm-thick and a nominal 1/2-inch-wide interspace.
3. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x °F.
1) Maximum Allowable U-Factor: 0.24 (winter).
2) Maximum Allowable U-Factor: 0.24 (summer).
b. Solar Heat Gain Coefficient: NFRC 200.
1) Maximum Allowable SHGC: 0.32.
c. Solar Optical Properties: NFRC 300.

1.4 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Samples: 12-inch-square, for each type of glass product indicated, other than monolithic clear float glass.

C. Glazing Schedule: Use same designations indicated on Drawings.

D. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data.

B. Manufacturer's Special Warranty: Manufacturer’s standard form made out and signed by coated-glass manufacturer agreeing to replace glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
1. Warranty Periods:
a. Laminated glass: 10-year warranty.
b. Coated glass: 5-year warranty.
c. Insulating glass: 10-year warranty.
2. Warranties shall be clearly noted or highlighted, with products used (listed above) called out.

1.6 QUALITY ASSURANCE

A. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing according to ASTM C 1087, samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants:

B. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201.

C. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. IGMA Publication for Insulating Glass: SIGMA TM-3000, "Glazing Guidelines for Sealed Insulating Glass Units."

D. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the Insulating Glass Certification Council.

PART 2 PRODUCTS

2.1 FABRICATORS

A. Approved Fabricators.
   1. Cardinal Glass.
   2. Guardian.
   3. Manko.
   4. Oldcastle.
   5. Pilkington.
   6. Viracon.
   7. Vitro.
   8. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 TEMPERED GLASS (TG-1) FOR TYPICAL INTERIOR USE

A. Tempered Glass: Comply with ASTM C1048 for monolithic tempered glass; 1/4-inch & 1/2-inch total thickness; clear.

B. Tempered Glass shall be installed at all interior locations unless noted otherwise.

2.3 LAMINATED GLASS (LG-1)

A. Glass Type LG-1: Equivalent to Trosifol Enhanced “SentryGlas”.
   1. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified.
      a. Overall Unit Thickness: 5/16-inch.
      b. Thickness of Each Annealed Glass Lite: 1/8-inch.
      c. Interlayer Thickness: 0.060-inch PVB.
      d. LG-1 Interlayer color/opacity: Clear/transparent.
      e. Install at locations as indicated on drawings.
      f. Fabricate with 5" openings for speak-thrus where indicated.

2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.4 TRANSPARENT INSULATING-GLASS UNITS (IG-1)

A. Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace and complying with ASTM E2190 and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
   1. Provide tempered glass as required by code.
   2. Where tempered glass is not required, provide heat-strengthened float glass.
      a. The glazing supplier shall review contract documents to determine areas of differential shading and shall furnish heat-strengthened glass units as required.
   3. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
   4. Sealing System: Dual seal with silicone seal secondary.
   5. Warm-edge spacer: Technoform I-Spacer warm-edge spacer.
      a. Color: Black.

B. Insulating-Glass Unit Assembly and Performance:
   1. Overall Unit Thickness: 1 inch (nominal).
   2. Exterior Glass: 1/4-inch Solarban 70 (2) + Clear.
   3. Interspace: 1/2-inch argon fill
   4. Visible Light Transmittance: 64%.
   5. Visible Reflection Out: 13%.
   6. Visible Reflection In: 14%.
   7. UV Imperial (winter): Argon: 0.24
   8. Winter Nighttime U-Factor: Argon: 0.24
   9. Solar Heat Gain Coefficient: 0.27.
   10. Light to Solar Gain: 2.37.

2.5 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
   1. Neoprene, ASTM C 864.
   2. EPDM, ASTM C 864.
   3. Silicone, ASTM C 1115.
   4. Thermoplastic polyolefin rubber, ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
   1. Neoprene.
   2. EPDM.
   3. Silicone.
   4. Thermoplastic polyolefin rubber.

2.6 GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:
   1. Compatibility: Select glazing sealants that are compatible with one another and with other

materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Elastomeric Glazing Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
1. Neutral-Curing Silicone Glazing Sealants.
a. Available Products:
1) Dow Corning 795 or 799, Tremco Proglaze SSG or equivalent product.
2) Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; non-staining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, ± 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore, Type A durometer hardness required by glass manufacturer to maintain glass lites in place for installation

indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Outside Corner Conditions: Vertical corner aluminum break metal shape, 0.040 thickness, flush with the outside face of glazing units on either side of the corner. Outside lites to extend to corner as much as possible. Finish to match Aluminum Composite Panel Color 1.

2.9 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

PART 3 EXECUTION

3.1 GLAZING

A. General: 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.
   1. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
   2. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
   3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
   4. 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.
   5. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
   6. Provide spacers for glass lites where length plus width is larger than 50 inches.
   7. 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.

B. Tape Glazing: Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
   1. Cover vertical framing joints by applying tape to heads and sills first and then to jambs. Cover horizontal framing joints by applying tape to jambs and then to heads and sills.
   2. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

3. Apply heel bead of elastomeric sealant.
4. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
5. Apply cap bead of elastomeric sealant over exposed edge of tape.

C. Gasket Glazing (Dry): Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretching during installation.
1. 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.
2. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
3. Install gaskets so they protrude past the face of glazing stops.

D. Sealant Glazing (Wet): Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
1. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
2. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.2 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to the glass surface. Remove non-permanent labels, and clean surfaces. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended by glass manufacturer.

B. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

END OF SECTION

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SECTION 09 0512

CONCRETE FLOOR MOISTURE CONTENT AND PH TESTING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Concrete moisture content testing using water vapor emission method.
   2. Concrete moisture content testing using relative humidity method.
   3. Concrete pH testing.

B. Related Requirements:
   1. Division 09 flooring requiring moisture and pH testing. Specialty Flooring.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Conduct meeting at Project site to comply with requirements in Division 00 & 01 Specifications.

B. Scheduling: Schedule work to permit concrete moisture testing to be completed minimum one week and maximum 3 weeks before floor coverings are installed.

1.3 SUBMITTALS

A. Product Data:
   1. Submit model and manufacturer for calcium chloride test kits.
   2. Submit data indicating model, manufacturer, and calibration record for relative humidity measuring equipment.
   3. Submit data for floor slab treatment products.

B. Shop Drawings:
   1. Indicate test locations shown on building floor plan,

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

D. Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete moisture acceptable limits.

E. Test Reports: Report test results in chart form.
   1. Calcium Chloride Test Method: Indicate test dates, start/stop time, start/stop weight, weight gain in grams, water vapor emission rate, and pH levels.
   2. Relative Humidity Test Method: Indicate test dates, time, depth of test well, in-situ temperature, relative humidity, and pH levels.
   3. Submit a record of ambient air temperature, ambient relative humidity, and floor slab surface temperature when test sites are prepared, start of test, and end of test.
   4. Indicate condition of building enclosure including position of operable windows and exterior doors when test sites are prepared, start of test, and end of test.

5. Submit transcript of datalogger.
6. Indicate operational status of HVAC systems maintaining environmental condition of spaces where tests are conducted when test sites are prepared, start of test, and end of test.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver calcium chloride test kits to Project site in manufacturer's original, sealed packaging.

B. Accept test kits on site. Inspect test kits for damage. Replace damaged test kits.

1.5 FIELD CONDITIONS

A. Ambient Conditions:
1. Do not perform concrete moisture testing until the building is enclosed and HVAC system is operational.
2. Maintain building test areas at design operating conditions for minimum 48 hours before, during, and continuously after conducting testing.
3. When HVAC system is not operational at start of tests, maintain ambient conditions within test areas at 65°F to 85°F and 40 to 60 percent relative humidity for minimum 48 hours before, during, and continuously after conducting testing until building HVAC system can maintain design operating conditions.

PART 2 PRODUCTS

2.1 CALCIUM CHLORIDE TEST KITS

A. Calcium Chloride Test Kit: Comply with ASTM F1869.

2.2 RELATIVE HUMIDITY TEST EQUIPMENT

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. Vaisala www.vaisala.com.
2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Humidity and Temperature Probe and Meter: Comply with ASTM F2170.

2.3 PH TEST MATERIALS

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. Micro Essential Laboratory www.microessentiallab.com.
2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. pH Test Paper: Capable of indicating minimum 7.0 to 13 pH range.

C. pH Color Gage: Furnish pH test paper manufacturer's visual color gage to identify measured pH.

D. Water: Distilled or de-ionized.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

3.2 PREPARATION

A. When a building HVAC system is not operational and maintaining test areas at design operational conditions, install recording hygrometer or data logger in each separate test area to record ambient temperature and relative humidity beginning 48 hours before start of tests until completion of tests within each area.

B. Identify three moisture test sites for first 1,000 sf and one moisture test site for each additional 1,000 sf of floor area receiving floor covering on each separate floor slab.
   1. Layout test site locations uniformly distributed throughout each test area.

C. Mechanically clean each test site to remove oils, laitance, curing compounds, adhesives, and other contaminates affecting water vapor emissions.
   1. Remove cleaning residue.
   2. Do not apply water or other liquid to floor slabs and test sites.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform concrete moisture tests and inspections and prepare test reports:

B. Acceptance Criteria:
   1. Concrete floor slabs will be considered acceptable for installation of floor finishes when:
      a. Calcium Chloride Test Result: 3 lbs of water/1000 sf in 24 hours maximum moisture vapor transmission rate.
      b. Relative Humidity Test Result: 75 percent maximum relative humidity.
      c. pH Test Result: Within alkalinity range of 7.0 to 9.0.
   2. When concrete floors do not meet acceptance criteria, obtain recommendations from floor finish manufacturers for remediation measures necessary to permit successful floor finish installation.

C. Concrete Moisture Testing - General.
   1. Conduct calcium chloride test and relative humidity test at each test site.
   2. Conduct one pH test at each test site.

D. Calcium Chloride Testing:
   1. Perform tests in accordance with ASTM F1869.

E. Relative Humidity Testing:
   1. Perform tests in accordance with ASTM F2170.
   2. Conduct relative humidity testing at the following depths:
      a. Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.
      b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.

3. Drill test hole at each test site to accommodate test sleeve.
   a. Hole Diameter: In accordance with test equipment manufacturer's instructions.
   b. Drilling Fluids: Not permitted.
4. Vacuum dust and debris from test hole.
5. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.
6. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.
7. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.
8. Measure and record temperature and relative humidity at the test site.

F. pH Testing:
   1. Place several drops of water onto the concrete surface to form a puddle approximately 1-inch in diameter.
   2. Allow the water to set for approximately 60 seconds.
   3. After 60 seconds, dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading.
   4. Record and report results.

END OF SECTION

SECTION 09 2116.23

GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Shaft-wall enclosures.
   2. Chase enclosures.
   3. Stair enclosures.
   4. Horizontal enclosures.
   5. Rated enclosure identification.

1.2 SUBMITTALS

A. Product Data: For each gypsum board shaft-wall assembly indicated.

1.3 QUALITY ASSURANCE

A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.

B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide USG - 5/8” Type X gypsum board or a comparable product by one of the following:
   1. American Gypsum Company.
   2. BPB America Inc.
   3. G-P Gypsum.
   4. Lafarge North America Inc.
   5. National Gypsum Company.
   6. PABCO Gypsum.
   7. Temple-Inland Forest Products Corporation.
   8. USG Corporation.
   9. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
   1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
   2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

2.3 PANEL PRODUCTS

A. Gypsum Liner Panels: Comply with ASTM C 442/C 442M.
   1. Type X: Manufacturer's proprietary liner panels with moisture-resistant paper faces.
      a. Core: 1 inch thick as specified per drawings.
      b. Long Edges: Double bevel.
   2. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels and with moisture- and mold-resistant core and surfaces; comply with ASTM D 3273.
      a. Core: 1 inch thick as specified per drawings.
      b. Long Edges: Double bevel.

B. Gypsum Board: As specified in Division 09 Section "Gypsum Board Assemblies".

2.4 NON-LOAD-BEARING STEEL FRAMING

A. Framing Members: Comply with ASTM C 754 for conditions indicated.

B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
   1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot dip galvanized, unless otherwise indicated.

2.5 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.

B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board Assemblies" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.

C. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board Assemblies".

D. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

E. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
   1. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
   2. Power-Actuated Anchors: Fastener system of type suitable for application indicated,

fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

F. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
   1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
   2. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 35 percent by weight.

2.6 GYPSUM BOARD SHAFT-WALL ASSEMBLIES

A. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing agency.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Fire-Resistance Rating: 2 hours.

C. STC Rating: 51, minimum.

D. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
   1. Depth: As indicated.
   2. Minimum Base-Metal Thickness: As indicated.

E. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in-depth matching studs.
   1. Minimum Base-Metal Thickness: Matching steel studs.

F. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dietrich Metal Framing; The System by Metal-Lite, Inc.
      b. Fire Trak Corp.: Fire Trak attached to studs with Fire Trak Slip Clip.
      c. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

G. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.0329 inch thick.

H. Room-Side Finish: As indicated.

I. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.

J. Insulation: Sound attenuation blankets.

PART 3 EXECUTION

3.1 PREPARATION

A. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft-wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

3.2 INSTALLATION

A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
   1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
   2. Division 09 Section "Gypsum Board Assemblies" for applying and finishing panels.

B. Do not bridge architectural or building expansion joints with shaft-wall assemblies, frame both sides of expansion joints with furring and other support.

C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
   1. At elevator hoistway entrance door frames, provide jamb struts on each side of door frame.
   2. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with 0.0312-inch minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 gypsum board face-layer panel.

D. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.

E. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.

F. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.

G. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

H. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.

I. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with

manufacturer's written instructions, whichever are more stringent.

J. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 4 inches of the shaft face of structural beams, floor edges, and similar projections into shaft, install 1/2- or 5/8-inch-thick, gypsum board cants covering tops of projections. No recesses allowed (at steel beams especially).
   1. Slope can't panel at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft-wall framing.
   2. Where steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft-wall framing.

K. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 IDENTIFICATION

A. Permanently identify rated walls with signs or stenciling in concealed spaces as follows:
   1. Located within 15 feet of end of each wall and at intervals not exceeding 30 feet measured horizontally along wall or partition.
   2. Lettering: Not less than 3 inches in height with minimum 3/8-inch stroke in contrasting color incorporating the following suggested wording: "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS" or other wording.

3.4 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and 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

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SECTION 09 2216

NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes non-load-bearing steel framing members for the following applications:
   1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
   2. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. Sound Transmission Characteristics: For STC-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Installer to verify minimum sizes indicated meet code requirements for all framing conditions.

PART 2 PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
   2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized ASTM A 653/A 653M, G60, hot-dip galvanized manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.

B. Hanger Attachments to Concrete:
   1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
      a. Type: Post-installed, chemical anchor or post-installed, expansion anchor.

2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch-diameter.

D. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538-inch and minimum 1/2-inch-wide flanges.
1. Depth: 1-1/2 inches.

E. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges, 3/4-inch-deep.
2. Steel Studs: ASTM C 645.
a. Minimum Base-Metal Thickness: 0.033-inch (20-gauge).
b. Depth: As indicated on Drawings.
3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8-inch-deep.
a. Minimum Base Metal Thickness: 0.033-inch (20-gauge).
4. Resilient Furring Channels: 1/2-inch-deep members designed to reduce sound transmission.
a. Configuration: Asymmetrical or hat shaped.

F. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
a. Armstrong World Industries, Inc.; Drywall Grid Systems.
b. Chicago Metallic Corporation; Drywall Furring System.
c. USG Corporation; Drywall Suspension System.
d. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES

A. Steel Studs and Runners: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.027-inch (22-gauge).

B. Slip-Type Head Joints: Where indicated, provide the following:
1. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
2) Superior Metal Trim; Superior Flex Track System (SFT).
3) Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

C. Firestop Track: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
   1. Minimum Base-Metal Thickness: 0.0179-inch.

E. Cold-Rolled Channel Bridging: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
   1. Depth: 1-1/2 inches.
   2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.

F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
   1. Minimum Base Metal Thickness: 0.0179-inch.
   2. Depth: 7/8-inch.

G. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
   1. Configuration: Asymmetrical or hat shaped.

H. Cold-Rolled Furring Channels: 0.0538-inch bare-steel thickness, with minimum 1/2-inch-wide flanges.
   1. Depth: 3/4-inch.
   2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of 0.0312-inch.
   3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch-diameter wire, or double strand of 0.0475-inch-diameter wire.

I. Z-Shaped Furring: With slotted or non-slotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8-inch, minimum bare-metal thickness of 0.0179-inch, and depth required to fit insulation thickness indicated.

2.4 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
   1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
   2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
   3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
   4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

3.2 INSTALLING SUSPENSION SYSTEMS

A. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

B. Suspend hangers from building structure as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
      a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
   2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
      a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
   3. Do not attach hangers to steel roof deck.
   4. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
   5. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
   6. Do not connect or suspend steel framing from ducts, pipes, or conduit.

C. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

E. Installation Tolerances: Install suspension systems that are level to within 1/8-inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.3 INSTALLING FRAMED ASSEMBLIES

A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

B. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
   1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
   2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
      a. Install two studs at each jamb, unless otherwise indicated.
      b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
      c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
   3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
   4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

C. Direct Furring:
1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

D. Z-Furring Members:
1. Erect insulation (specified in Division 07 Section "Thermal Insulation") vertically and hold in place with Z-furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8-inch from the plane formed by faces of adjacent framing.

END OF SECTION

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SECTION 09 2900

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Interior gypsum board.
   2. Rated enclosure identification.
   3. Tile backing panels: See Section 09 3000.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

PART 2 PRODUCTS

2.1 INTERIOR GYPSUM BOARD

A. General: Complying with ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Gypsum Co.
      b. CertainTeed Gypsum Inc.
      c. G-P Gypsum.
      d. National Gypsum Company.
      e. USG Corporation.
      f. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Regular Type:
   1. Thickness: 5/8-inch.
   2. Long Edges: Tapered.

C. Type X:
   1. Thickness: 5/8-inch.
   2. Long Edges: Tapered.

D. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
   1. Thickness: 5/8-inch.
   2. Long Edges: Tapered.
   3. Provide Type X unless noted otherwise on drawings.

E. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
   1. Core: 5/8-inch, Type X.
   2. Long Edges: Tapered.
   3. Provide at the following locations: All wet wall and plumbing locations.

2.2 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
   2. Shapes:
      a. Cornerbead.
      b. Bullnose bead.
      c. LC-Bead: J-shaped; exposed long flange receives joint compound.
      d. L-Bead: L-shaped; exposed long flange receives joint compound.
      e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
      f. Expansion (control) joint.
      g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.3 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Wallboard: Paper.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
   1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
   2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
   3. Fill Coat: For second coat, use drying-type, all-purpose compound.
   4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
   1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants".

E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wood, or rock wool.

PART 3 EXECUTION

3.1 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.2 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:
   1. Regular Type: As indicated on Drawings.
   2. Type X: As indicated on Drawings.
   3. Ceiling Type: Ceiling surfaces.
   4. Moisture- and Mold-Resistant Type: As indicated on Drawings.

3.3 INSTALLING 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 C 840 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. Bullnose Bead: Use at outside corners.
   3. LC-Bead: Use at exposed panel edges.
   4. U-Bead: Use at exposed panel edges.

3.4 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints, rounded or beveled edges, and damaged surface areas.

C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
   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 09 9000 “Painting and Coatings”.

3.5 IDENTIFICATION

A. Permanently identify rated walls with signs or stenciling in concealed spaces as follows:
   1. Located within 15 feet of end of each wall and at intervals not exceeding 30 feet measured horizontally along wall or partition.
   2. Lettering: Not less than 3 inches in height with minimum 3/8 inch stroke in contrasting color incorporating the following suggested wording: “FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS” or other wording.

3.6 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. 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

SECTION 09 3000

TILING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Porcelain floor tile.
   2. Porcelain tile base.
   3. Porcelain stair treads.
   4. Waterproof membrane for thin-set tile installations.
   5. Crack-suppression membrane for thin-set tile installations.
   6. Cementitious backer units installed as part of tile installations.
   7. Metal edge strips installed as part of tile installations.

1.2 SUBMITTALS

A. Submit under provisions of Division 00 & 01 Specifications.

B. Product Data: For each product specified.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details. Show widths, details, and locations of expansion, contraction, control, and isolation joints.

1.3 CLOSEOUT SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
   2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. See Finish Schedule for product manufacturers, colors, and patterns.

2.2 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

B. Porcelain Floor & Wall Tile: Flat tile as follows:
   1. Composition: Porcelain.

2. Dimensions: See drawings.
3. Face: Plain with square or cushion edges.
4. Products:
    a. See finish schedule for product manufacturers.
    b. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

C. Porcelain Stair Tread - match characteristics of adjoining tile.
1. Composition: Porcelain.
2. Module: 12" x 24".

2.3 ACCESSORY MATERIALS

A. Waterproofing and Crack-Suppression Membranes for Thin-Set Tile Installations: Manufacturer's standard product that complies with ANSI A118.10 and ANSI A118.12, selected from the following.
1. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.
2. Chlorinated-Polyethylene-Sheet Product: Non-plasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric, 0.030-inch nominal thickness.
    a. Available Product: Noble Company (The); Chloraloy.
        1) Use at all shower floors and any other location recommended by manufacturer.
        2) Provide pre-formed corners to minimize potential for leaks.
    b. Available Product: Nobel Company (The); NobleSeal TS.
        1) Use at all wet locations other than shower floors.
3. Latex-Portland Cement Product: Flexible mortar with acrylic-latex additive.
    a. Available Products:
        1) Boiardi Products Corporation; Elastiment 323.
        2) MAPEI Corporation; Mapelastic Turbo.
        3) Southern Grouts & Mortars, Inc.; Southcrete 1100.
        4) TEC Specialty Products Inc.; TA-324, Triple Flex.
4. Urethane Waterproofing and Tile-Setting Adhesive: One-part liquid-applied urethane, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    a. Available Products:
        1) Bostik; Hydroment Ultra-Set.
        2) Southern Grouts & Mortars, Inc.; Deck-Seal 1000.

2.4 SETTING AND GROUTING MATERIALS

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Available Approved Manufacturers:
1. Bonsal, W. R., Company.
2. Bostik.
3. Custom Building Products.
4. LATICRETE International Inc.
5. MAPEI Corporation.
6. Summitville Tiles, Inc.
7. TEC Specialty Products Inc.

C. Standard Dry-Set Cement Mortar (Thin Set): ANSI A118.1.
   1. Basis of Design: MAPEI Corporation; Kerabond.

D. Modified Dry-Set Cement Mortar, Non-Sag for Walls, Nonslump for Floors, for Large and Heavy Tile with High-Transfer Technology: ANSI A118.4HTE, ANSI A118.11, and ISO 13007 C2TE.
   1. Prepackaged dry-mortar mix containing dry additive to which only water must be added.
      a. Basis of Design: MAPEI Corporation; Keraflex Plus.
   2. Prepackaged dry-mortar mix combined with liquid-latex additive.
      a. Basis of Design: MAPEI Corporation; Kerabond T/Keralastic.
   3. For wall applications, provide non-sag mortar ('T' rated mortar).
      a. Basis of Design: MAPEI Corporation; Ultralite Mortar.

E. Chemical-Resistant, Water-Cleanable, Premium Tile-Setting and -Grouting Epoxy: For grout joints from 1/16 inch to 3/8 inch, ANSI A118.3 and ISO 13007 R2/RG.
   1. Basis of Design: MAPEI Corporation; Kerapoxy CQ.

2.5 MISCELLANEOUS MATERIALS

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Elastomeric Sealants: Elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 07 Section "Joint Sealants."
   1. At backsplash conditions, provide clear sealant.
   2. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   3. One-Part, Mildew-Resistant Silicone: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for in-service exposures of high humidity and extreme temperatures.
      a. Available Products:
         1) Dow Corning Corporation; Dow Corning 786.
         2) GE Silicones; Sanitary 1700.
         3) MAPEI Corporation; Mapesil T Plus. (Matches grout colors, plus clear).
         4) Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
         5) Tremco, Inc.; Tremsil 600 White.
   4. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.
      a. Available Products:
         1) Bostik; Chem-Calk 550.
         2) Mameco International, Inc.; Vulkem 245.
         3) Pecora Corporation; NR-200 Urexpan.
         4) Tremco, Inc.; THC-900.

C. Cementitious Backer Units: ANSI A118.9 in maximum lengths available to minimize end-to-end butt joints.
   1. Thickness: 1/2 inch.
   2. Available Products:
      a. C-Cure; C-Cure Board 990.
      b. Custom Building Products; Wonderboard.
      c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.

d. USG Corporation; DUROCK Cement Board.

D. Trowelable Underlayments and Patching Compounds: Latex-modified, Portland cement-based formulation provided or approved by manufacturer of tile-setting materials.
1. Basis of Design (Concrete Floors): MAPEI Corporation; Mapecem Quickpatch.
2. Basis of Design (Floor/Wall and Render Mortar): MAPEI Corporation.; Planitop 330 Fast.

E. Metal Edge Strips: Angle or L-shape, satin anodized aluminum exposed-edge material.

F. Metal Stair nosings: Provide non-slip tread nosing at all tile tread stairs. Basis of Design Schluter Trep-E.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

E. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.2 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCNA Installation Guidelines: TCNA's current "Handbook for Ceramic Tile Installation". Comply with TCNA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform

joint widths, unless otherwise indicated.

F. Expansion Joints:
   1. Locate expansion joints and other sealant-filled joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
   2. Locate joints in tile surfaces directly above joints in concrete substrates.
   3. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
   4. Install expansion and control joints in accordance with TCNA method EJ171. Install proper sealant and backing material (backer rod and/or bond breaker tape) per TCNA method EJ171. Sealant must not bond to backing material and only form a 2 sided bond. For above-ground installations, additional movement joints are required.

G. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated.
   1. For chemical-resistant epoxy grouts, comply with ANSI A108.6.

H. Install waterproofing to comply with ANSI A108.13 and waterproofing manufacturer's written instructions to produce waterproof membrane of uniform thickness bonded securely to substrate.
   1. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

I. For installations indicated below, follow procedures in ANSI A108 Series tile installation standards for providing 95 percent mortar coverage.
   1. Tile floors in wet areas.
   2. Tile floors in laundries/ware wash & kitchens.
   3. Tile floors composed of tiles 8 by 8 inches or larger.
   4. Tile floors composed of rib-backed tiles.

J. Install tile on floors with the following joint widths: unless noted otherwise by product manufacturer.
   1. Thin 3-5 mm (GPT/GPTPS) porcelain tile: 1/16-1/8 inch.

K. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
   1. Floor Transitions: Schluter - Reno-U & Reno-TK, Brushed Stainless Steel. Exposed edge-material.
   2. Wall Transitions: Schluter - Jolly, Brushed Stainless Steel. Exposed edge-material.
   3. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

L. Install tile on walls with the following joint widths: unless noted otherwise by product manufacturer.
   1. Porcelain Tile: 1/16-inch.

3.3 FLOOR TILE INSTALLATION SCHEDULE

A. Interior floor installation on concrete; thin-set mortar; TCNA F113.
   1. Thin-Set Mortar: Modified dry-set cement mortar.
   2. LHT Mortar required at large and heavy tile per ANSI ‘H’ rated mortar.
   3. Grout: Polymer-modified grout per ANSI A118.7.

B. Interior floor installation on waterproof membrane over concrete; thin-set mortar; TCNA F122.
   1. Thin-Set Mortar: Modified dry-set cement mortar.
   2. LHT Mortar required at large and heavy tile per ANSI ‘H’ rated mortar.
   3. Grout: Polymer-modified grout.

3.4 WALL TILE INSTALLATION SCHEDULE

A. Interior wall installation over glass-mat, water-resistant backer board; thin-set mortar; TCNA W245.
   1. Thin-Set Mortar: Modified dry-set cement mortar.
   2. LHT Mortar required at large and heavy tile per ANSI ‘H’ rated mortar.
   3. Grout: Polymer-modified grout per ANSI A118.7.

END OF SECTION

SECTION 09 5123

ACOUSTICAL TILE CEILINGS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated. Include product test reports and research/evaluation reports.

B. Coordination Drawings: Drawn to scale and coordinating acoustical tile ceiling installation with hanger attachment to building structure and ceiling mounted items. Show size and location of initial access modules.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Acoustical Ceiling Units: Full-size tiles equal to 2.0 percent of quantity installed.
   2. Suspension System Components: Quantity of each concealed grid and exposed component equal to 2.0 percent of quantity installed.

1.4 QUALITY ASSURANCE

A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory.

B. Fire-Test-Response Characteristics:
   1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
      a. Identify materials with appropriate markings of applicable testing and inspecting agency.
   2. Surface-Burning Characteristics: Acoustical tiles complying with ASTM E 1264 for Class A materials, when tested per ASTM E 84.
      a. Smoke-Developed Index: 450 or less.

PART 2 PRODUCTS

2.1 ACOUSTICAL TILE CEILINGS, GENERAL

A. Acoustical Tile Standard: Comply with ASTM E 1264.

B. Metal Suspension System Standard: Comply with ASTM C 635.

C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung", unless otherwise indicated. Comply with seismic design requirements.
   1. Anchors in Concrete: Cast-in-place anchors fabricated from corrosion-resistant materials, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
   2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

D. Wire Hangers, Braces, and Ties: Zinc-coated carbon-steel wire; ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
   1. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire but provide not less than 0.106-inch-diameter wire.

E. Seismic struts and seismic clips.

F. Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

2.2 MANUFACTURERS

A. Approved Manufacturers:
   1. USG.
   2. Armstrong.
   3. Certainteed.
   4. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Ceiling Tile ACT1:
   1. USG Mars High-NRC
   2. Size: 24” x 24” unless noted otherwise in drawings.
   3. Edge Detail: Angled Tegular.
   4. NRC: 0.80 minimum.
   5. Color: White.
   6. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.

B. Metal Suspension System Characteristics: Comply with requirements indicated in the Acoustical Panel Ceiling Schedule at the end of Part 3.

C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural

and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.

D. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
   1. Postinstalled Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

E. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

F. Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical tile edge details and suspension systems indicated; formed from sheet metal of same material and finish as that used for exposed flanges of suspension system runners. Provide bullnose corner cover at any bullnose CMU locations.
   1. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
   2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Armstrong World Industries, Inc.
      b. CertainTeed.
      c. Chicago Metallic Corporation.
      d. USG Interiors, Inc.
      e. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

G. Basis of Design:
   1. Available products include the following:
      a. Armstrong “Prelude”, 15/16-inch, exposed tee grid system.
      b. USG Donn DX 15/16-inch.
      c. Certainteed.
      d. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.
   2. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, pre-painted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G01 coating designation; other characteristics as follows:
      a. Structural Classification: Intermediate-duty system.
   3. Access: Upward, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates and structural framing to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage, and other conditions affecting performance of acoustical tile ceilings.
   1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other Sections.

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width units at borders and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

A. General: Install acoustical tile ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook".
   1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
   2. U.B.C.'s "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings": U.B.C. Standard 25-2.

B. Suspend ceiling hangers from building's structural members and as follows:
   1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
   2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
   3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
   4. Do not attach hangers to steel deck tabs.
   5. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; and provide hangers not more than 8 inches from ends of each member.

C. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
   1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8-inch in 12 feet. Miter corners accurately and connect securely.

D. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
   1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.

3.4 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

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SECTION 09 6513

RESILIENT BASE AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Resilient base.
   2. Resilient stair accessories.
   3. Transition strip materials.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 CLOSEOUT 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 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 RESILIENT BASE: RB1

A. Resilient Base:
   1. Manufacturers: Subject to compliance with requirements, provide products by the following:
      a. Tarkett.
      b. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Resilient Base Standard: ASTM F 1861.
   1. Material Requirement: Type TV (vinyl, thermoplastic).
   2. Manufacturing Method: Group I (solid, homogeneous).
   3. Style: Cove (base with toe).

C. Minimum Thickness: 0.125-inch.

D. Height: 4 inches.

E. Lengths: Coils in manufacturer's standard length.

F. Outside Corners: Job formed or preformed.

G. Inside Corners: Job formed or preformed.

H. Finish: As selected by Architect from manufacturer's full range.

I. Colors and Patterns: See Finish Schedule.

2.2 RESILIENT STAIR NOSING

A. Basis of Design: Tarkett SLN-XX-A at Stair S-2.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Colors and Patterns: Match vinyl base color.

2.3 TRANSITION STRIP MATERIALS

A. Carpet/ Sealed Concrete (TS1): Rubber transition to be selected by Architect from manufacturer’s standards.

B. LVT/ Carpet (TS2): Rubber transition to be selected by Architect from manufacturer’s standards.

C. Carpet/ Vinyl Composite Tile (TS3): Rubber transition to be selected by Architect from manufacturer’s standards.

D. Carpet/ Slab Edge (TS4): Metal transition at carpet to slab edge, to be selected by Architect from manufacturer's standards. Basis of Design: Schluter Vinpro-S.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
   1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
      a. Cove Base Adhesives: Not more than 50 g/L.
      b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of carpet tiles at stairs, and in maximum available lengths to minimize running joints.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
   4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 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 practicable 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.

3.3 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:
   1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
   2. Tightly adhere to substrates throughout length of each piece.
   3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

3.4 TRANSITION STRIP INSTALLATION

A. Comply with manufacturer’s written instructions for installing transition strips.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Cover resilient products until Substantial Completion.

END OF SECTION

SECTION 09 6519

RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Vinyl composition floor tile.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
   1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor tile.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor tile installation.

D. Close spaces to traffic for 48 hours after floor tile installation.

E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE: VCT1

A. Products: Subject to compliance with requirements, provide the following:
   1. Armstrong Flooring Commercial - Standard Excelon Imperial Texture VCT.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125-inch.

E. Size: 12 by 12 inches.

F. Colors and Patterns: As selected by Architect from Manufacturer's Full Range.

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 manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
   4. Moisture Testing: Perform tests recommended by floor covering manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as space where they are to be installed.
   1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
   1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of floor tiles.

B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
   1. Apply two coat(s) minimum.

C. Cover floor tile until Substantial Completion.

END OF SECTION

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SECTION 09 6520

LUXURY VINYL PLANK FLOORING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Luxury vinyl floor tile.

1.2 SUBMITTALS

A. Product Data: For each product indicated.

B. Shop Drawings: Show the following:
   1. Luxury vinyl floor tile type, color, and dye lot.
   2. Pattern of installation.
   3. Insets and borders.
   4. Type, color, and location of edge, transition, and other accessory strips.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

C. Provide manufacturer’s 10-year standard warranty.
   1. Warranty shall be clearly noted or highlighted.

1.4 PROJECT CONDITIONS

A. Maintain a temperature of not less than 65°F or more than 95°F in spaces to receive floor tile for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods.
   1. After post-installation period, maintain a temperature of not less than 65°F or more than 95°F.

B. Install floor tile after other finishing operations, including painting, have been completed.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

B. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
   1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
   2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 65°F and 95°F.

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer. Flooring to be same temp. as surrounding area prior to installation.

PART 2 PRODUCTS

2.1 VINYL FLOOR TILE - LVT1 & LVT2

A. Products: See Finish Schedule for Manufacturers, Products, Patterns, and Colors.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Quality Portland hydraulic cement based latex underlayment material or other approved by flooring manufacturer for applications indicated. Provide patch at all major cracks, joints etc. that may cause telegraphing through tile.

B. Adhesives: Utilize manufacturer’s recommended adhesive for substrate condition.

PART 3 EXECUTION

3.1 EXAMINATION

A. Concrete Slabs:
   1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. dependent on size of area to receive flooring and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after

substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

3.2 INSTALLATION

A. Concrete Subfloors:
   1. Concrete subfloors must be dry, smooth, and free from dust, solvent, paint, wax, grease, oil, asphalt sealing compounds and other extraneous materials. The surface must be hard and dense, and free from powder or flaking.

B. Before installing floor tile:
   1. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods. Do not use solvents.
   2. Fill all cracks, holes, and depressions in substrates and abrade until completely level. Use only quality Portland hydraulic cement based latex underlayment material as recommended by manufacturer.
   3. Move resilient floor tile and installation accessories into spaces where they will be installed at least 48 hours before installation, unless longer conditioning periods are recommended in writing by manufacturer. Install products only after they are at the same temperature as the space where they are to be installed.
   4. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Layout: Balance the layout of the plank format. Proper planning and layout will prevent narrow plank widths at wall junctures. Determine layout to prevent having less than 1/2 plank width or very short length pieces. Accurately measure the room to determine the center line, adjust this established line to accommodate a balanced layout and then transpose this line to a comfortable width away from the starting wall (approximately 2’ to 3’ wide). Apply the adhesive in this area and begin installing planks.
   1. Do not walk on freshly installed planks.

D. Adhere tiles to flooring substrates using a manufacturer’s recommended adhesive to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections. Install adhesive as recommended by manufacturer.

E. Roll with minimum 100 pound three-section floor roller immediately after installation. Roll flooring in both directions to firmly seat tile into adhesive.

F. Maintain temperature control for 48 hours prior to installation as well for adhesive to set.

G. Protect flooring from all traffic for 48 hours and protect from construction until substantial completion.

H. After 48 hours, damp mop to remove residual dirt.

END OF SECTION

SECTION 09 6813

TILE CARPETING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes:
   1. Modular carpet tile.
   2. Carpet tile entrance mats.

1.2 SUBMITTALS

A. Product Data: For each product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation methods.

B. Shop Drawings: Show the following:
   1. Carpet tile type, color, and dye lot.
   2. Pattern of installation.
   3. Entrance Mats: Type of installation.
   4. Insets and borders.
   5. Type, color, and location of edge, transition, and other accessory strips.
   6. Tile Carpeting: Transition details to other flooring materials.

C. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tile to include in maintenance manuals specified in Division 00 & 01. Include the following:
   1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
   2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

B. Entrance Mats General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

C. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
   1. Warranty Period: 10 years from date of Substantial Completion.

D. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Carpet Tile: Full-size units equal to 3 percent of amount installed for each type indicated,

but not less than 10 sq. yd.

2. Deliver extra stock material neatly bundled and clearly labeled to Owner at project closeout.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics for Entrance Mats: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling".

1.6 PROJECT CONDITIONS

A. Tile Carpeting: Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation".

B. Entrance Mats: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity".

C. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

D. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

E. Tile Carpeting: Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

PART 2 PRODUCTS

2.1 TILE CARPETING: CPT1 & CPT2

A. Products: See Finish Schedule for Manufacturers, Products, Patterns, and Colors.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 CARPET TILE FOR ENTRANCE MATS: WOC1

A. Products: See Finish Schedule for Manufacturers, Products, Patterns, and Colors.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit

products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Entrance Mats: Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with requirements specified.

B. Concrete Subfloors for Entrance Mats: Verify that concrete slabs comply with ASTM F 710 and the following:
   1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
   2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
   3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. Concrete Slabs:
   1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
      a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
      c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Entrance Mats: Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ENTRANCE MATS: PREPARATION

A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation", and carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 TILE CARPETING: PREPARATION

A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes, and depressions 1/8-inch-wide or wider, and protrusions more than 1/32-inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.4 ENTRANCE MATS: INSTALLATION

A. General: Comply with CRI 104, Section 13, "Carpet Modules (Tiles)".

B. Installation Method: Glue-down; install every tile with releasable adhesive.

C. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

3.5 TILE CARPETING: INSTALLATION

A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

B. Confirm proper moisture content per manufacturer’s recommended method. Provide mitigation if concrete moisture is above manufacturer limits.

C. Installation Method: Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.

D. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

3.6 ENTRANCE MATS: CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:
   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
   2. Remove yarns that protrude from carpet tile surface.
   3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI 104, Section 15, "Protection of Indoor Installations".

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

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SECTION 09 9000

PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and field painting of exposed exterior items and surfaces.

B. Surface preparation and field painting of exposed interior items and surfaces.

C. Painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

1.2 RELATED SECTIONS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 05 5000 - Metal Fabrications.

C. Section 08 1113 - Hollow Metal Doors and Frames.

D. Section 09 2900 - Gypsum Board Assemblies.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM) D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. Steel Structures Painting Council (SSPC) SP6 - Commercial Blast Cleaning Procedures.

C. Steel Structures Painting Council (SSPC) SP10 - Near White Blast Cleaning Procedure.

1.4 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16.
   1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
   2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
   3. Semi-gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
   4. Full gloss refers to a high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

B. Environments: The following terms distinguish between different corrosive exposures:
   1. "Severe environments" are highly corrosive industrial atmospheres with sustained exposure to high humidity and condensation and with frequent cleaning using strong chemicals. Environments with heavy concentrations of strong chemical fumes and

frequent splashing and spilling of harsh chemical products are severe environments.

2. "Moderate environments" are corrosive industrial atmospheres with intermittent exposure to high humidity and condensation, occasional mold and mildew development, and regular cleaning with strong chemicals. Environments with exposure to heavy concentrations of chemical fumes and occasional splashing and spilling of chemical products are moderate environments.
3. "Mild environments" are industrial atmospheres with normal exposure to moderate humidity and condensation, occasional mold and mildew development, and infrequent cleaning with strong chemicals. Environments with low levels of mild chemical fumes and occasional splashing and spilling of chemical products are mild environments. Normal outdoor weathering is also considered a mild environment.

1.5 SUBMITTALS

A. Submit under provisions of Division 00 & 01 Specifications.

B. Product Data for each paint system indicated, including:
   1. Material List: An inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Preparation instructions and recommendations.
   3. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
   4. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

1.6 CLOSEOUT SUBMITTALS

A. Furnish extra paint materials from the same production run as the materials applied and, in the quantities, described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.
   1. Quantity: Furnish Owner with an additional three percent, but not less than 1 gal or 1 case, as appropriate, of each material and color applied.

1.7 QUALITY ASSURANCE

A. All materials, preparation and workmanship shall conform to requirements of the latest edition of the Architectural Painting Specification Manual by the Master Painters Institute (MPI) as issued by the location MPI Accredited Quality Assurance Association having jurisdiction.

B. Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Paint exposed surfaces. If an item or a surface is not specifically mentioned, paint the item, or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.

D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label:

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45ºF. Maintain storage containers in a clean condition, free of foreign materials and residue.
   1. Protect from freezing. Keep the storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside the manufacturer’s absolute limits.

B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50ºF and 90ºF.

C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45ºF and 95ºF.

D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5ºF above the dew point; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Approved Manufacturers: on Drawings.
   1. Sherwin Williams (Basis of Design).
   2. Benjamin Moore.
   3. PPG.
   4. Diamond Vogel.
   5. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 PAINT MATERIALS - GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that meet the applicable local, state, or federal VOC requirements.

C. Color: Refer to Finish Schedule and Paint Legend for paint colors.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until the substrates have been properly prepared.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (Clay and CMU): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
   1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
   2. If a potential incompatibility of primers applied by others exists, obtain the following from the primer Applicator before proceeding:
      a. Confirmation of primer's suitability for expected service conditions.
      b. Confirmation of primer's ability to be top coated with materials specified.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each substrate condition and as specified.
   1. Provide barrier coats over incompatible primers or remove primers and reprime substrate.
   2. Cementitious Substrates: Prepare concrete, brick, concrete masonry block, and cement plaster surfaces to be coated. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods to prepare surfaces.
      a. Use abrasive blast-cleaning methods if recommended by coating manufacturer.
      b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not coat surfaces if moisture content

exceeds that permitted in manufacturer's written instructions.

3. Wood Substrates: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Smoothly sand surfaces exposed to view and dust off.
    a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer, before applying primer.
    b. Immediately on delivery, prime edges, ends, faces, undersides, and backsides of wood to be coated.
    c. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
4. Ferrous Metal Substrates: Clean un-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
    a. Blast-clean steel surfaces as recommended by coating manufacturer and according to SSPC-SP 10.
    b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, solvent clean, and touch up with same primer as the shop coat.
5. Nonferrous-Metal Substrates: Clean nonferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
    a. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
3. Use only the type of thinners approved by manufacturer and only within recommended limits.
4. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

B. Application Procedures: Apply coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. The number of coats and film thickness required is the same regardless of application method.
2. Completed Work: Match approved Samples for color, texture, and coverage. Remove, refinish, or recoat work that does not comply with specified requirements.

C. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
   1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. For wood finishes, varnishes, and epoxies, sand, and dust between each coat to provide an anchor for next coat and remove defects visible from distance up to 39 inches or as recommended by manufacturer.
   2. Omit primer on metal surfaces that have been shop primed and touchup painted.
   3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
   4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform, or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:
   1. Piping, pipe hangers, and supports.
   2. Tanks.
   3. Motors and mechanical equipment.
   4. Accessory items.

G. Electrical items to be painted include, but are not limited to, the following:
   1. Conduit and fittings.
   2. Switchgear.
   3. Panelboards.

H. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

3.5 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing, or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

C. After the work of other trades is complete, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Steel and Iron Substrates (includes piping):
   1. Alkyd System:
      a. Prime Coat: Primer, alkyd, anticorrosive, for metal.
         1) PPG Paints Multiprime 4360 Rust Inhibitive Primer.
         2) Sherwin-Williams KEM BOND HS Alkyd Primer, B50 Series.
         3) Diamond Vogel Iron Prime 250 Fast Dry Primer.
      b. Topcoat: Alkyd, exterior, semi-gloss.
         1) PPG Paints HPC Alkyd 4306 Semi-Gloss Enamel.
         2) Sherwin-Williams DTM Alkyd Enamel, B55-100 Series.
         3) Diamond Vogel CoteAll Multi-Purpose Alkyd Enamel.

C. Galvanized-Metal Substrates:
   1. Latex System:
      a. Prime Coat: Primer, galvanized, water based.
         1) PPG Paints PITT-TECH Plus EP 90-1908 100% Acrylic DTM Primer.
         2) Sherwin-Williams Pro Industrial DTM Acrylic Primer/Finisher, B66W00011 Series.
         3) Diamond Vogel Vers-Acryl 300 Acrylic DTM Primer.
      b. Topcoat: Latex, exterior, semi-gloss.
         1) PPG Paints 6-900XI Speedhide Exterior Semi-Gloss.
         2) Sherwin Williams A-100 100% Acrylic Exterior Latex, A82 Series.
         3) Diamond Vogel PermAcryl Exterior 100% Acrylic Latex.

D. Aluminum Substrates:
   1. Latex System:
      a. Prime Coat: Primer, quick dry, for aluminum.
         1) PPG Paints: 17-921XI Seal Grip Primer.
         2) Sherwin-Williams Multi-Purpose Interior/Exterior Latex Primer, B51-450 Series.
         3) Diamond Vogel Diamond Prime Universal Interior/Exterior Primer.
      b. Topcoat: Latex, exterior, semi-gloss.
         1) PPG Paints 6-900XI Speedhide Exterior Semi-Gloss.
         2) Sherwin-Williams A-100 100% Acrylic Exterior Latex, A82 Series.
         3) Diamond Vogel PermAcryl Exterior 100% Acrylic Latex.

E. Wood Substrates: Wood trim, doors, windows, wood board siding, and wood fences.
   1. Latex over Latex Primer System:
      a. Prime Coat: Primer, latex for exterior wood.
         1) PPG Paints 17-921XI Seal Grip Int/Ext Primer.
         2) Sherwin-Williams Multi-Purpose Interior/Exterior Latex Primer, B51 Series.
         3) Diamond Vogel Weather-Plate Exterior 100% Acrylic Latex Primer.
      b. Topcoat: Latex, exterior, flat.
         1) PPG Paints 6-610XI Speedhide Exterior Latex Flat.
         2) Sherwin-Williams A-100 100% Acrylic Exterior Latex, A06 Series.
         3) Diamond Vogel EverCryl Exterior Acrylic Latex.

c. Topcoat: Latex, exterior, low sheen.
   1) PPG Paints 6-2045XI Speedhide Exterior Latex Satin.
   2) Sherwin-Williams A-100 100% Acrylic Exterior Latex, A12 Series.
   3) Diamond Vogel EverCryl Exterior Acrylic Latex.
d. Topcoat: Latex, exterior, semi-gloss.
   1) PPG Paints 6-900XI Speedhide Exterior Semi-Gloss.
   2) Sherwin-Williams A-100 100% Acrylic Exterior Latex, A82 Series.
   3) Diamond Vogel PermAcryl Exterior 100% Acrylic Latex.

2. Latex System:
   a. Prime Coat: Primer, alkyd for exterior wood.
      1) PPG Paints 17-941NF Seal Grip Alkyd Primer.
      2) Sherwin-Williams Fast Dry Interior/Exterior Oil-Based Primer, Y24 Series.
      3) Diamond Vogel Prime-O-Seal Exterior Alkyd Primer-Sealer.
   b. Topcoat: Latex, exterior, flat.
      1) PPG Paints 6-610XI Speedhide Exterior Latex Flat.
      2) Sherwin-Williams A-100 100% Acrylic Exterior Latex, A06 Series.
      3) Diamond Vogel EverCryl Exterior Acrylic Latex.
   c. Topcoat: Latex, exterior, low sheen.
      1) PPG Paints 6-2045XI Speedhide Exterior Latex Satin.
      2) Sherwin Williams A-100 100% Acrylic Exterior Latex, A12 Series.
      3) Diamond Vogel EverCryl Exterior Acrylic Latex.
   d. Topcoat: Latex, exterior, semi-gloss.
      1) PPG Paints 6-900XI Speedhide Exterior Semi-Gloss.
      2) Sherwin-Williams A-100 100% Acrylic Exterior Latex, A82 Series.
      3) Diamond Vogel PermAcryl Exterior 100% Acrylic Latex.

3.7 INTERIOR PAINTING SCHEDULE

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Gypsum Board Substrate:
   1. Walls:
      a. One (1) coat, latex primer:
         1) PPG Paints; Speedhide Zero VOC Interior Latex Primer/Sealer, 6-4900XI.
         2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer.
         3) Diamond Vogel equivalent.
      b. Two (2) coats, acrylic-latex enamel (eggshell):
         1) PPG Paints; Speedhide Zero VOC Interior Latex.
         2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer.
   2. Walls, wet environments (All restrooms):
      a. One (1) coat, latex primer:
         1) PPG Paints; SealGrip Acrylic.
         2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer.
      b. Two (2) coats, epoxy (semi-gloss):
         1) PPG Paints; Aquapon WB EP Epoxy 98-1.
         2) Sherwin-Williams Pro Industrial Water based Epoxy.
         3) Diamond Vogel equivalent.
   3. Ceilings:
      a. One (1) coat, latex primer:
         1) PPG Paints; Speedhide Zero VOC Interior Latex Sealer/Primer, 6-4900XI.
         2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28 Series.

3) Diamond Vogel Pro Max Interior Latex Primer/Sealer.
b. Two (2) coats, Acrylic-Latex (flat):
1) PPG Paints; 12-110 Speedhide Pro EV Latex Wall & Ceiling.
2) Sherwin-Williams ProMar 200 Zero VOC Interior Latex.
3) Diamond Vogel Elevate Interior Latex Ultra Flat Ceiling Paint.

C. Steel Substrate:
1. Hollow Metal Doors and Frames:
a. One (1) coat, water-based primer:
1) PPG Paints; Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer/Finish, 90-1908.
2) Sherwin-Williams Pro Industrial Pro-Cryl Acrylic Universal Metal Primer.
3) Diamond Vogel Vers-Acryl 303 Acrylic DTM Primer/Finish.
b. Two (2) coats, alkyd/acrylic enamel (semi-gloss):
1) PPG Paints; 6-1410 Speedhide Interior/Exterior WB Alkyd.
2) Sherwin-Williams Pro Industrial WB Alkyd Urethane Enamel, B53 Series.
3) Diamond Vogel SureFlo Acrylic Latex Enamel.
2. Handrails.
a. One (1) coat, water-based primer:
1) PPG Paints; Pitt-Tech Plus EP Interior/ Exterior DTM Industrial Primer/Finish, 90-1908.
2) Sherwin-Williams Pro Industrial Pro-Cryl Acrylic Universal Metal Primer.
3) Diamond Vogel Vers-Acryl 303 Acrylic DTM Primer/Finish.
b. Two (2) coats, two component, water-based epoxy (gloss):
1) PPG Paints; Aquapon WB EP 98-1 Waterborne Epoxy.
2) Sherwin-Williams Pro Industrial Pre-Cat WB Epoxy K46 Series.
3) Diamond Vogel Vers-E-Poxy 131 Waterborne Acrylic Epoxy.
3. Galvanized-Metal Substrates & Ductwork:
a. One (1) coat, water-based primer:
1) PPG Paints; Pitt-Tech Plus EP Interior/Exterior DTM Industrial Primer/Finish, 90-1908.
2) Sherwin-Williams Pro Industrial Pro-Cryl Primer.
3) Diamond Vogel Vers-Acryl 303 Acrylic DTM Primer/Finish.
b. Two (2) coats, Water based enamel (satin):
1) PPG Paints; Pitt-Tech Plus EP Interior/Exterior Satin DTM Industrial Enamel, 90-1510.
2) Sherwin-Williams Pro Industrial Acrylic.
3) Diamond Vogel Vers-Acryl 303 Acrylic DTM Primer/Finish.

D. Wood Substrate:
1. Doors, Frames, Trim and Chair Rails: Opaque Alkyd System:
a. One (1) coat, latex primer:
1) PPG Paints; Seal Grip Primer, 17-921XI.
2) Sherwin-Williams Multi-Purpose Interior/Exterior Latex Primer, B51 Series.
3) Diamond Vogel OmniPrep Universal Interior Primer.
b. Two (2) coats, alkyd/oil enamel (semi-gloss):
1) PPG Paints; 6-1510 Speedhide Interior/Exterior WB Alkyd Semi.
2) Sherwin-Williams Pro Industrial WB Alkyd Urethane, B53 Series.
3) Diamond Vogel Satinamel Interior/Exterior Alkyd Satin Enamel.
2. Plywood: Epoxy System, 50° or higher:
a. Primer: AquaPon WB EP Epoxy, 98-1 (Semi-Gloss or Gloss) applied @ 3.0 mils.
1) Diamond Vogel: Vers-E-Poxy 131 Waterborne Acrylic Epoxy.
b. Topcoat: AquaPon WB Epoxy, 98-1 (Semi-Gloss or Gloss) applied @ 3.0 mils.

1) Diamond Vogel Vers-E-Poxy 131 Waterborne Acrylic Epoxy.

c. Epoxy System, 32° or warmer:

d. Primer: Amerlock 600 Solvent-Based Epoxy, (Semi-Gloss) applied @ 5.0mils DFT.
   1) Diamond Vogel Mult-E-Poxy 180 Epoxy Mastic.

e. Topcoat: Amerlock 600 Solvent-Based Epoxy, (Semi-Gloss) applied @ 5.0 mils DFT.
   1) Diamond Vogel: Mult-E-Poxy 180 Epoxy Mastic.

END OF SECTION

SECTION 10 1400

IDENTIFICATION DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior Signage.

1.2 SUBMITTALS

A. Shop Drawings: Indicate sign styles, lettering and locations, and overall dimensions of each sign.
   1. Owner to approve room numbering and locations prior to installation.

B. Samples:
   1. One full size sample sign of each type specified, including method of attachment.
   2. One set illustrating colors available for selection.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

B. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, the following:
   1. Deterioration of finishes beyond normal weathering.
   2. Deterioration of embedded graphic image.
   3. Separation or delamination of sheet materials and components.
   4. Warranty Period: Five years from date of Substantial Completion.
   5. Warranty shall be clearly noted or highlighted.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Package signs, labeled in name groups.

B. Enclose a copy of applicable installation instructions in each package.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   1. Manufacturers of Door Signs:
      a. Latitude Sign Systems, Inc.
      b. Archetype.
      c. Signs Now.
      d. Parker Signs.
      e. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 INTERIOR SIGNAGE

A. Type A.
   1. Basis of Design: Latitude - Room ID.
      a. Size: A: 4” x 8”.
      b. Text: Helvetica LT Std Roman.
      c. Color: TBD.
      d. Location: All new rooms not listed as sign type B or C.

B. Type B.
   1. Basis of Design: Latitude - Room ID.
      a. Size: 4” x 8” with paper insert.
      b. Text: Helvetica LT Std Roman.
      c. Color: TBD.
      d. Location: Private offices and intake rooms.

C. Type C.
   1. Basis of Design: Latitude - Room ID.
      a. Size: 9” x 9”.
      b. Text: Helvetica LT Std Roman.
      c. Color: TBD.
      d. Location: Restrooms & stairs.

D. Type D - Exit Door Signage.
   1. Basis of Design: Latitude - Room ID.
      a. Size: 3" x 6".
      b. Text: Helvetica LT Std Roman; Signage verbiage, “EXIT” w/ braille below.
      c. Color: TBD.
      d. Location: All exits doors.
      e. Signage to comply with IBC Section 1013.4.

E. Type F - Fire Protection Equipment Signage.
   1. Basis of Design: Latitude - Room ID.
      a. Size: 4" x 8".
      b. Text: Helvetica LT Std Roman; Signage Verbiage to be dictated by Authority Having Jurisdiction.
      c. Color: TBD.
      d. Location: Fire Sprinkler 117.
      e. Signage to comply with IFC Section 509.

F. Vinyl Sign Backer.
   1. Provide vinyl signage backer at all locations that signage is installed on glazing.
   2. Material & Colors:
      a. Opaque: To be constructed of high performance cast vinyl graphic film products such as 3M Scotchcal or equal with a 5 year or greater warranty.
      b. Font and Color: To match signage type.
   3. Provide backer in sizes & quantities indicated on shop drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install sign units level, plumb, with sign surfaces free from distortion or other defects of appearance.

C. Room Signage:
   1. Install signs in locations as directed by Architect and approved by local authority having jurisdiction.
   2. Confirm room numbering with Owner.
   3. Clean and polish.

END OF SECTION

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SECTION 10 1419

DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Illuminated, fabricated channel dimensional characters.
   2. Illuminated, molded-plastic dimensional characters.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For dimensional letter signs.
   1. Include fabrication and installation details and attachments to other work.
   2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
   3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
   4. Show locations of electrical service connections.
   5. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

D. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

E. Delegated-Design Submittal: For signs indicated in "Performance Requirements" Article.
   1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.
   2. Warranty shall be clearly labeled or highlighted.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120°F, ambient; 180°F, material surfaces.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

A. Fabricated Channel Characters: Metal face and side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability and for securing fasteners; and as follows.
   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:
   2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
      a. ACE Sign Systems, Inc.
      b. Allen Industries, Inc.; Architectural Division.
      c. APCO Graphics, Inc.
      d. A. R. K. Ramos Signage Systems.
      e. Latitude,
      f. Diskey Sign Company.
      g. Gemini Incorporated.
      h. Metallic Arts.
      i. Nelson-Harkins Industries.
      j. Poblocki Sign Company, LLC.
      k. Steel Art Company.
      l. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.
   3. Character Material: Sheet or plate aluminum.
   4. Character Height: 8".
   5. Character Depth: 1".
   6. Finishes:
      a. Integral Aluminum Finish: Black anodized.
   7. Mounting: Projecting studs.
      a. Hold characters at distance as selected by Architect from wall surface.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
   2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
   3. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
   4. Sign Mounting Fasteners:
      a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.4 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
   2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed sides. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
   3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
   4. Internally brace signs for stability and for securing fasteners.
   5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
   6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

B. Mounting Methods:
   1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
      a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
      b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION

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SECTION 10 2600

WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Related Sections:
   1. Section 06 1000 "Rough Carpentry".
   2. Section 09 2900 "Gypsum Board Assemblies".

B. This Section includes the following:
   1. Protective Corner Guards.

1.2 SUBMITTALS

A. General: Submit the following in accordance with conditions of contract and Division 00 & 01 Specifications.

B. Product Data: Submit physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements. Also include the following:
   1. Manufacturer's Installation Instructions: Submit procedures, and perimeter conditions requiring special attention.
   2. Product data and detailed specifications for each system component and installation accessory required, including installation methods for each type of substrate.
   3. Product test reports from a qualified independent testing laboratory showing compliance of each component with requirements indicated.

C. Shop drawings showing locations, extent and installation details of corner guards. Show methods of attachment to adjoining construction.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
   1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Deliver materials to the project site in unopened original factory packaging clearly labeled to

show manufacturer.

C. Store materials in original, undamaged packaging in a cool, dry place out of direct sunlight and exposure to the elements. A minimum room temperature of 40°F and a maximum of 100°F should be maintained.

D. Material must be stored flat.

1.5 QUALITY ASSURANCE

A. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.6 PROJECT CONDITIONS

A. Materials must be acclimated in an environment of 65° - 75°F for at least 24 hours prior to beginning the installation.

B. Installation areas must be enclosed and weatherproofed before installation commences.

1.7 COORDINATION

A. Coordinate Work with wall or partition sections for installation of concealed blocking or anchor devices. Coordinate with contractor providing wall blocking, to ensure that blocking is provided in all areas that require corner guards.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Basis of Design: C/S Construction Specialties.
   2. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 CORNER GUARDS

A. Vinyl Acrylic Protective Devices: Equal to C/S Surface-Mounted Corner Guard, height as indicated on Drawings; 1 1/2-inch-radius as shown.
   1. Location: Outside corners where indicated on Drawings.
   2. Materials:
      a. “Acrovyn Corner Guards VA-200” 0.090-inch-thick, a high-impact acrylic vinyl material with anti-bacterial agent; minimum outside corner radius; secure with self-adhesive surface mount tape.
   3. Size: 1-1/2 inch x 1-1/2 inch cover.
   4. Color: As selected by Architect from full range of manufacturer’s standard colors.
   5. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.3 FABRICATION

A. Fabricate components with tight joints, corners and seams.

B. Pre-drill holes for attachment.

C. Form end trim closure by capping and finishing smooth.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of conditions: 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.

3.2 PREPARATION

A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.

B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.3 INSTALLATION

A. Install the work of this section in strict accordance with the manufacturer's recommendations, using only approved mounting hardware, and locating all components firmly into position, level and plumb.

B. Temperature at the time of installation must be between 65° - 75°F and be maintained for at least 48 hours after the installation.

3.4 CLEANING

A. General: Immediately upon completion of installation, clean guards in accordance with manufacturer's recommended cleaning method.

B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.5 PROTECTION

A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

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SECTION 10 2800

TOILET AND BATH ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Public-use washroom accessories.
   2. Custodial accessories.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule:
   1. Identify locations using room designations indicated on Drawings.
   2. Identify products using designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to be included in maintenance manuals.

B. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 15 years from date of Substantial Completion.
   2. Warranty shall be clearly noted or highlighted.

PART 2 PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Bobrick Washroom Equipment, Inc.
   2. Tork Global.
   3. American Specialties, Inc.
   4. Bradley Corporation.

C. Grab Bar TBA-1.
   1. Basis-of-Design Product: B-6806.
   2. Mounting: Flanges with concealed fasteners.
   3. Material: Stainless steel, 0.05-inch-thick.
      a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area.
   4. Outside Diameter: 1-1/2 inches.
   5. Configuration and Length: As indicated on Drawings and according to ADA guidelines.

D. Sanitary-Napkin Disposal Unit TBA-2.
   1. Basis-of-Design Product: B-270.
   2. Mounting: Surface mounted.
   3. Door or Cover: Self-closing disposal-opening cover.
   4. Receptacle: Removable.
   5. Material and Finish: Stainless steel, No. 4 finish (satin).

E. Toilet Tissue (Roll) Dispenser TBA-3.
   1. Owner provided, GC installed.

F. Mirror Unit TBA-4A.
   1. Basis-of-Design Product: B-290 series.
   2. Frame: Stainless-steel angle, 0.05-inch-thick.
      a. Corners: Welded and ground smooth.
   3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
      a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
      b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
   4. Size: As indicated on Drawings.

G. Mirror Unit with Shelf TBA-4B.
   1. Basis-of-Design Product: B-292 series.
   2. Frame: Stainless-steel angle, 0.05-inch-thick.
      a. Corners: Welded and ground smooth.
   3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
      a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
      b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
   4. Size: As indicated on Drawings.

H. Liquid-Soap Dispenser TBA-5.
   1. Wall Mounted: Basis-of-Design Product: B-2012.
      a. Owner provided, GC installed.

I. Combination Towel (Folded) Dispenser/Waste Receptacle TBA-6.
   1. Owner provided, GC installed.

J. Diaper-Changing TBA-7.
   1. Basis-of-Design Product: Koala KB300.
   2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
      a. Engineered to support a minimum of 250-lb static load when opened.
   3. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
   4. Operation: By pneumatic shock-absorbing mechanism.
   5. Material and Finish: High-density polyethylene in manufacturer's standard color.
   6. Liner Dispenser: Built in.
   7. Location: ADA RR 103.

K. Utility Shelf with Mop and Broom Holder TBA-8.
   1. Basis-of-Design Product: B-239x34.
   2. Description: With exposed edges turned down not less than 1/2-inch and supported by two triangular brackets welded to shelf underside.
   3. Size: 34 inches L x 13 inches H x 8 inches D.
   4. Material and Finish: Not less than nominal 0.05-inch-thick stainless steel, No. 4 finish (satin).
   5. Provide at all janitor closets and at other locations as noted on Drawings.

L. Paper Towel (Folded) Dispenser TBA-9.
   1. Owner provided, GC installed.

2.2 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 4 keys to Owner's representative.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer’s written instructions.

END OF SECTION

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SECTION 10 4400

EMERGENCY ACCESS CABINETS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire department access cabinets.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Coordinate sizes and locations of fire department access cabinets with jurisdiction having authority.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN MANUFACTURER

A. Knox Company, www.knoxbox.com.
   1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Size, location, and type, and number of cabinets: as required by jurisdiction having authority.
   1. Recessed cabinets are recommended for new masonry or concrete construction.

C. Options: Tamper switch.

D. Finish: As selected by Architect.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with jurisdiction having authority and manufacturer’s direction.

END OF SECTION

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SECTION 10 4413

FIRE EXTINGUISHER CABINETS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes fire protection cabinets for fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 PRODUCTS

2.1 MATERIALS

A. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3-mm thick, Class 1 (clear).

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Fire End & Croker Corporation.
      b. J. L. Industries, Inc., a division of Activar Construction Products Group.
      c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
      d. Larsen's Manufacturing Company.
      e. Modern Metal Products, Division of Technico Inc.
      f. Moon-American.
      g. Potter Roemer LLC.
      h. Watrous Division, American Specialties, Inc.
      i. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Cabinet Material: Steel.

C. Semi-Recessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semi-recessed cabinet installation.
   1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
   2. Cabinet Trim Material: Semi recessed steel painted white epoxy.
   3. Door Material: Steel painted white epoxy.

D. Door Style: Vertical duo panel with frame.

E. Door Glazing: Tempered float glass (clear).

F. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

G. Accessories:
   1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
   2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
   3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
      a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
         1) Location: Applied to cabinet door.
         2) Application Process: Decals.
         3) Lettering Color: Red.
         4) Orientation: Vertical.

H. Finishes:
   1. Steel: Painted white epoxy primer finish.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub), with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Miter and weld joints and grind smooth.

PART 3 EXECUTION

3.1 INSTALLATION

A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.

B. Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Identification: Apply decals at locations indicated.

E. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

F. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

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SECTION 10 4416

FIRE EXTINGUISHERS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. 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.
      b. Faulty operation of valves or release levers.
   2. Warranty Period: Six years from date of Substantial Completion.
   3. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

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.

C. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

PART 2 PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. Amerex Corporation.
      b. Ansul Incorporated; Tyco International Ltd.
      c. Badger Fire Protection; a Kidde company.
      d. Buckeye Fire Equipment Company.

e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
h. Larsen's Manufacturing Company.
i. Moon-American.
j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
k. Potter Roemer LLC.
l. Pyro-Chem; Tyco Safety Products.
m. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type:
1. Class A Hazard: 3-A:40-B:C nominal capacity, with dry chemical in manufacturer's standard enameled container.

2.2 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard 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. Amerex Corporation.
b. Ansul Incorporated; Tyco International Ltd.
c. Badger Fire Protection; a Kidde company.
d. Buckeye Fire Equipment Company.
e. Fire End & Croker Corporation.
f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
g. Larsen's Manufacturing Company.
h. Potter Roemer LLC.
i. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

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 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION

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SECTION 10 5113

METAL LOCKERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Standard metal lockers.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For metal lockers. Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For units with factory-applied color finishes.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures.
      b. Faulty operation of latches and other door hardware.
   2. Damage from deliberate destruction and vandalism is excluded.
   3. Warranty Period: Two years from date of Substantial Completion.
   4. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Where metal lockers are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities".

B. Pre-Installation Meeting: Conduct meeting at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver and Install after all other trades such as painting have been completed.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

B. Steel Tube: ASTM A 500 cold rolled.

C. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.

D. Anchors: Material, type, and size required for secure anchorage to each substrate.
   1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
   2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 STANDARD METAL LOCKERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide the following: List Industries, Inc. Heavy-Duty Corridor KD Wardrobe Lockers, or comparable product by one of the following:
   1. ASI Storage Solutions Inc.; Traditional Collection.
   2. DeBourgh Mfg. Co.
   3. Hadrian Manufacturing Inc.
   4. Penco Products, Inc., Subsidiary of Vesper Corporation.
   5. Republic Storage Systems Company.
   6. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Locker Arrangement: Single tier.
   1. Locker Type A: Single tier, 18-inches-wide by 18-inches-deep by 72-inches-high with sloping tops.
   2. Accessible Locker: Provide handicap accessible lockers of the same sizes indicated above. Provide a minimum of 5 percent of the total of each type. Lockers shall be distributed throughout the corridors for an even distribution. Indicate locations on the Shop Drawing for the Architect's review. Accessible lockers shall comply with the accessibility requirements for clear floor space, reach ranges and operable parts per ADA and ICC/ANSI A117.1. Provide a decal with the international symbol of accessibility on the face of the locker door.

C. Material: Cold rolled steel sheet.

D. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet as follows:
   1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal-thickness, with single bed at sides.
   2. Backs and Sides: 0.024-inch nominal-thickness, with full-height, double-flanged connections.
   3. Shelves: 0.024-inch nominal-thickness, with double bend at front and single bend at sides and back.

E. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuously, integral door strikes full height on vertical main frames.
   1. Frame Vents: Fabricate face frames with vents.

F. Doors: One piece; fabricated from 14-gauge minimum thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
   1. Reinforcement: Brace or reinforce the inner face of doors with minimum 20-gauge full height, 3-inch-wide minimum, door stiffener welded to the inner door face.
   2. Door Style: Vented panel as follows:
      a. Concealed Vents: Slotted perforations in top and bottom horizontal return flanges of doors.

G. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
   1. Hinges: Manufacturer's standard, steel continuous.

H. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond face of door; pry and vandal resistant.
   1. Single-Point Latching: Nonmoving latch hook designed to engage bolt of built-in combination or cylinder lock.
      a. Latch Hook: Equip each door with one latch hook, fabricated from 0.105-inch nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

I. Equipment: Equip each metal locker with identification plate and the following unless otherwise indicated:
   1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.

J. Finish: Baked enamel or powder coat.
   1. Color(s): As selected by Architect from manufacturer's full range.

K. Quantities and Locations:
   1. Quantity: 2 Lockers.
   2. Locations: Gun Room 134.

2.3 FABRICATION

A. Fabricate metal lockers square, rigid, and without warp and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
   1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
   2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

B. Fabricate each metal locker with an individual top, bottom, and back; and common intermediate uprights separating compartments. Factory weld frame members of each metal locker together to form a rigid, one-piece assembly.

C. Knocked-Down Construction: Fabricate metal lockers using nuts, bolts, screws, or rivets for nominal assembly at Project site.

D. Hooks: Manufacturer's standard ball-pointed type, aluminum, or steel; zinc plated.

E. Coat Rods: Fabricated from 1-inch-diameter steel; powder coat finish.

F. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8-inch-high.

G. Accessible Lockers:
   1. Locate the bottom shelf no lower than 15 inches above the floor.
   2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above floor.

2.4 STEEL SHEET FINISHES

A. Factory finish steel surfaces and accessories except stainless-steel and chrome-plated surfaces.

B. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.
   1. The anchor locker runs at ends and at intervals recommended by the manufacturer. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
   2. Anchor single rows of metal lockers to walls near top and bottom of lockers.

B. Knocked-Down Metal Lockers: Assemble with standard fasteners, with no exposed fasteners on door faces or face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
   1. Attach hooks with at least two fasteners.
   2. Attach door locks on doors using security-type fasteners.
   3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
      a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
   4. Attach filler panels with concealed fasteners.
   5. Attach boxed end panels with concealed fasteners to conceal exposed ends of non-recessed metal lockers.

3.2 ADJUSTING, CLEANING, AND PROTECTION

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

C. Touch up marred finishes or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION

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SECTION 10 7500

FLAGPOLES

PART 1 GENERAL

1.1 SUMMARY

A. The section includes ground-mounted aluminum flagpoles.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
   1. Seismic Loads: according to SEI/ASCE 7.
   2. Wind Loads: Basis Wind Speed of 110 mph.
   3. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show general layout, jointing, grounding method, and anchoring/support systems.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as a complete unit from a single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. General: Spiral wrap flagpole with heavy kraft paper or other weathertight wrapping and enclosed in hard fiber tube or other protective container.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Flagpole; a Kearney-National Inc. company.
   2. Baartol Company.
   3. Concord Industries, Inc.
   4. PoleTech.

5. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 FLAGPOLES

A. Exposed Height: 35 feet and 30 feet.

B. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241, Alloy 6063, with a minimum wall thickness of 3/16-inch, temper T6.

C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch nominal wall thickness. Provide with 3/16-inch steel bottom plate and support plate; 3/4-inch-diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at the top of foundation tube for plumbing pole. Provide flashing collar of same material and finish as flagpole.

D. Cast-Metal Shoe Base: For anchor-bolt mounting; provide anchor bolts.

E. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter. Fabricate from 0.063-inch spun aluminum, finished to match flagpole.

F. Internal Halyard, Cam Cleat System: 5/16-inch Ø braided polypropylene halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door with compression seal secured with cylinder lock. Finish truck assembly to match flagpole.

G. Halyard Flag Snaps: Provide two bronze swivel snap hooks per halyard.
   1. Provide with neoprene or vinyl covers.

H. Location: See drawings.

2.3 MISCELLANEOUS MATERIALS

A. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107.

B. Sand: ASTM C 33, fine aggregate.

C. Elastomeric Joint Sealant: Joint sealant complying with requirements in Division 07 Section "Joint Sealants".

2.4 ALUMINUM FINISHES

A. Color Anodic Finish: AAMA 611-12, AA-M12C22A42/A44, Class I, 0.018-mm or thicker.
   1. Color: As selected by Architect from full range of industry colors and color densities.

B. Plate and Finish: Ferrous metal and bronze components to match pole.

C. Exterior Surface: Smooth and uninterrupted with uniform taper.

PART 3 EXECUTION

3.1 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Ground Set: Place foundation tube, center, and brace to prevent displacement during concreting. Install flagpole, plumb, in foundation tube. Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal the top of foundation tube with a 2 inch layer of elastomeric joint sealant and cover with flashing collar.

C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with non-shrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.

D. Mounting Brackets and Bases: Anchor brackets and bases securely through structural support with fasteners as indicated on Shop Drawings.

END OF SECTION

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SECTION 12 2413

ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes Roller Shades.

B. See Division 26 Sections for Electrical service and connections for motorized shade operation.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Window Treatment Schedule: Use same designations indicated on Drawings.
   2. Shade Fabric Product Data.

B. Shop Drawings: Include plans, elevations, sections, details, details of installation, operational clearances, and relationship to adjoining Work.
   1. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
   2. Coordination Drawings: Drawn to scale and coordinating penetrations and ceiling-mounted items.

C. Samples: For each exposed finish and for each color and texture required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

B. Manufacture’s standard warranty from date of Substantial Completion.
   1. Warranty shall be clearly noted or highlighted.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with WCMA A 100.1.

PART 2 PRODUCTS

2.1 ROLLER SHADES

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Draper Inc.

2. Hunter Douglas, Inc.; Hunter Douglas Window Fashions Division.
3. Lutron Shading Solutions by VIMCO.
4. MechoShade Systems, Inc.
5. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

B. Basis-of-Design Product: Subject to compliance with requirements, provide Mecco Shade 5 or a comparable product.
1. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

C. Shade Band Material: PVC-coated fiberglass
1. Colors: As selected by Architect from Manufacturer's Full Range.
2. Material Solar-Optical Properties: As indicated on Window Treatment Schedule.
3. Material Openness Factor: 3%.

D. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets. Provide capacity for one roller shade band(s) per roller.

E. Direction of Roll: Regular, from back of roller.

F. Mounting Brackets: Galvanized or zinc-plated steel.

G. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; removable design for access.

H. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide concealed, by pocket of shade material, internal type.

I. Mounting: Underside of window header, see drawings.

J. Shade Operation: Manual; with manufacturer’s standard lift system. Provide cordless lift operator if available.
1. Location: See Drawings.

K. Shade Operation: Motorized operator.
1. Location: See Drawings.

2.2 ROLLER SHADE FABRICATION

A. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at 74°F:
1. Shade Units Installed between (Inside) Jambs: Edge of shade not more than 1/4-inch from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
2. Shade Units Installed Outside Jambs: 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.

B. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting roller, and operating hardware and for hardware position and shade mounting method

indicated.

C. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

PART 3 EXECUTION

3.1 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

B. Connections: Connect motorized operators to building electrical system.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain roller shades. Refer to Division 01 Specifications.

END OF SECTION

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SECTION 14 2400

HYDRAULIC ELEVATORS

PART 1 GENERAL

1.1 SUMMARY

A. This Section specifies hydraulic elevators.

B. Work Required:
1. The work required under this section consists of all labor, materials and services required for the complete installation (including operational verification) of all the equipment required for the elevator(s) as herein specified.
2. All work shall be performed in a first class, safe and workmanlike manner.
3. In all cases where a device or part of the equipment is herein referred to in the singular, it is intended that such reference shall apply to as many of such devices or parts as are required to make complete installation.

C. Related work not specified herein: The following sections contain requirements that relate to this section and are performed by trades other than the elevator manufacturer/installer.
1. Section 01 5000 - Temporary Facilities and Controls: Protection of floor openings and personnel barriers; temporary power and lighting.
2. Section 03 3000 - Cast-In-Place Concrete: Elevator pit, elevator motor and pump foundation, and grouting thresholds.
3. Division 26 - Electrical:
    a. Main disconnects for each elevator.
    b. Electrical power for elevator installation and testing.
    c. Disconnecting device to elevator equipment prior to activation of sprinkler system.
    d. The installation of dedicated GFCI receptacles in the pit and overhead.
    e. Lighting in controller area, machine area and pit.
    f. Wiring for telephone service to controller.
4. Division 28 - Fire Alarm Systems: Fire and smoke detectors and interconnecting devices; fire alarm signal lines to contacts in the machine area.

D. Applicable Codes: Comply with applicable building and elevator codes at the project site, including but not limited to the following:
1. ANSI A117.1, Buildings and Facilities, Providing Accessibility and Usability for Physically Handicapped People.
2. ADAAG, Americans with Disabilities Act Accessibility Guidelines.
3. ANSI/NFPA 70, National Electrical Code.
4. ANSI/NFPA 80, Fire Doors and Windows.
5. ASME/ANSI A17.7, Safety Code for Elevators and Escalators.
6. ANSI/UL 10B, Fire Tests of Door Assemblies.
7. CAN/CSA C22.1, Canadian Electrical Code.
8. CAN/CSA-B44, Safety Code for Elevators and Escalators.
9. EN 12016 (May 1998): “EMC Product Family Standards for lifts, escalators, and passenger conveyors Part 2 - immunity”.
10. Local Building Codes.
11. All other local applicable codes.

1.2 SYSTEM DESCRIPTION

A. Substitutions for all products listed below: Allowed in accordance with Division 00 & 01 Specifications.

B. Equipment Description: Holeless Hydraulic elevator with Machine-Room Less application.

C. Equipment Control: Elevonic® Control System.

D. Quantity of Elevators: 1.

E. Elevator Stop Designations: 1 and 2

F. Stops: 2

G. Openings: In line.

H. Travel: 12'-3."

I. Rated Capacity: 2100 lb.

J. Rated Speed: 100 fpm.

K. Platform Size: 5' 9-1/2” W x 4’ 11-1/8” D.

L. Clear Inside Dimensions: 5’ 8-5/16” W x 4’ 3-9/16” D.

M. Cab Height: 7’ 9”.

N. Clear Cab Height: 7’ 9” with 5/16-inch floor recess and 4 LED ceiling.

O. Entrance Type and Width: Single-Slide Door 3’ 6”.

P. Entrance Height: 7’ 0”.

Q. Main Power Supply: 208-Volts, 3-Phase, 60Hz + or - 5% of normal, three-Phase, with a separate equipment grounding conductor.

R. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.

S. Machine and Controller Location: No machine-room required, tank and controller in hoistway pit.

T. Signal Fixtures: Manufacturer’s standard with stainless steel metal button targets (exc. CA).

U. Controller Location: Inside hoistway, accessible by a door in a side hoistway wall on the 1st or 2nd landing (1st landing only if rear entrance).

V. Stopping Accuracy: ± 1/4-inch under any loading condition or direction of travel.

W. Operation: Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been

answered, the car shall park at the last landing served.

X. Operating Features - Standard.
   1. Full Collective Operation.
   2. Anti-nuisance.
   3. Fan and Light Protection.
   4. Load Weighing Bypass.
   5. Independent Service.
   6. Full Collective Operation.
   7. Firefighters' Service Phase I and Phase II.
   8. Top of Car Inspection.

Y. Operation Features - Optional.
   1. Emergency Rescue Unit 'Back-up battery lowering'

Z. Door Control Features:
   1. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
   2. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
      Door protection shall consist of a two-dimensional, multi-beam array projecting across the car door opening.
   3. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

AA. Provide equipment according to seismic zone: 1.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer’s product data for each system proposed for use. Include the following:
   1. Signal and operating fixtures, operating panels and indicators.
   2. Cab design, dimensions and layout.
   3. Hoistway-door and frame details.
   4. Electrical characteristics and connection requirements.
   5. Expected heat dissipation of elevator equipment in hoistway (BTU).
   6. Color selection chart for Cab and Entrances.

B. Shop Drawings: Submit approval layout drawings. Include the following:
   1. Car, guide rails, buffers and other components in hoistway.
   2. Maximum rail bracket spacing.
   3. Maximum loads imposed on guide rails requiring load transfer to building structure.
   4. Clearances and travel of car.
   5. Clear inside hoistway and pit dimensions.
   6. Location and sizes of access doors, hoistway entrances and frames.

1.4 CLOSEOUT SUBMITTALS

A. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

B. The elevator contractor’s acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The warranty period shall not extend longer than one (1) year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The warranty excludes: ordinary wear and tear, improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.
   1. Warranty shall be clearly noted or highlighted.

1.5 QUALITY ASSURANCE

A. Manufacturer: Minimum of fifteen years experience in the fabrication, installation and service of elevators of the type and performance of the specified. The manufacturer shall have a documented quality assurance program.

B. Installer: Elevators shall be installed by the manufacturer.

C. Permits, Inspections and Certificates: The Elevator Contractor shall obtain and pay for necessary Municipal or State Inspection and permit as required by the elevator inspection authority, and make such tests as are called for by the regulations or such authorities. These tests shall be made in the presence of such authorities or their authorized representatives.

1.6 DELIVERY, STORAGE AND HANDLING

A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the contractor(s) will be responsible to provide a proper and suitable storage area on or off the premises.

B. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the contractor(s), will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the contractor(s) shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

1.7 MAINTENANCE AND SERVICE

A. Maintenance service consisting of regular examinations and adjustments of the elevator equipment shall be provided by the elevator contractor for a period of twelve (12) months after the elevator has been turned over for the customer’s use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

B. The elevator control system must:
   1. Provide in the controller the necessary devices to run the elevator on inspection operation.
   2. Provide on top of the car the necessary devices to run the elevator in inspection operation.
   3. Provide in the controller an emergency stop switch. This emergency stop switch when opened disconnects power from the brake and prevents the motor from running.

C. Provide system capabilities to enable a remote expert to create a live, interactive connection with the elevator system to enable the following functions:
   1. Remotely diagnose elevator issues with a remote team of experts.
   2. Remotely return an elevator to service.
   3. Provide real-time status updates via email.
   4. Remotely make changes to selected elevator functions including:
      a. Control building traffic: Restrict floor access, remove car from group operation, shut down elevator, select up peak / down peak mode, activate independent service.
      b. Conserve energy: Activate cab light energy save mode, activate fan energy save mode, shut down car(s).
      c. Improve passenger experience: Extend door open times, change parking floor, activate auto car full, activate anti-nuisance, advance door opening, door nudging, extend specific floor extended opening time, release trapped passengers.

PART 2 PRODUCTS

2.1 DESIGN AND SPECIFICATIONS

A. Provide machine-roomless holeless hydraulic elevators from Otis Elevator Company. The control system and car design based on materials and systems manufactured by Otis Elevator Company. Specifically, the system shall consist of the following components:
   1. The entire hydraulic system and the controller shall be located inside the hoistway. No extra machine room or control closet space is required.
   2. Sleep mode operation for LED ceiling lights and car fan.
   3. LED lighting standard in ceiling lights and elevator fixtures.
   4. Sleep mode operation for LED ceiling lights and car fan.

B. Approved Installer: Otis Elevator.

C. Substitutions: Allowed in accordance with Division 00 & 01 Specifications.

2.2 EQUIPMENT: MACHINE COMPONENTS

A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a low-pressure switch and a shut-off valve.

B. The entire hydraulic system with hydraulic-fluid storage tank, power component and valves shall be located in the hoistway pit and be easily accessible for maintenance through an

access door in the hoistway wall.

C. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three (3) phase overload device shall be provided to protect the motor against overloading.

D. The controller shall be located together with the hydraulic system in the hoistway pit and be easily accessible for maintenance through the same access door that is also used for the hydraulic system.

E. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.

F. Pressure Switch.

2.3 EQUIPMENT: HOISTWAY COMPONENTS

A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.

B. Car Guide Rails: Tee-section steel rails with brackets and fasteners.

C. Polyurethane type buffers shall be used.

D. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.

E. Hoistway Entrances:
   1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of UL fire rated steel.
   2. Sills shall be extruded aluminum.
   3. Doors: Entrance doors shall be of metal construction with vertical channel reinforcements.
   4. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hours (for M1, M2, M3, D1, and D2 Entrance Arrangements or 1 hour for D3 Entrance Arrangement.
   5. Entrance Finish: Satin stainless steel.
   6. Entrance marking plates: Entrance jambs shall be marked with 4” x 4” plates having raised floor markings with Braille located adjacent to the floor marking. Marking plates shall be provided on both sides of the entrance.
   7. Sight Guards: sight guards will be furnished with all doors painted to match with painted doors, painted black for stainless steel and gold satin doors.

2.4 EQUIPMENT: CAR COMPONENTS

A. Cab Steel Shell Cab with laminated vertical removable panels.

B. Paints and laminate to be selected from manufacturer’s catalog of choices.

C. Laminate to be selected from manufacturer’s catalog of choices.

D. Brushed Stainless Steel finished base plate located at top and bottom.

E. Car Front Finish: Satin Stainless Steel.

F. Car Door Finish: Satin Stainless Steel.

G. Ceiling Type:
   1. Flat steel ceiling Brushed Steel Finish (BSF) with 4 LED lights.

H. Emergency Car Lighting: An emergency power unit employing a 6-volt sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car in the event of building power failure.

I. Fan: A one-speed 120 VAC fan will be mounted to the structural ceiling to facilitate in-car air circulation, meeting A17.1 code requirements. The fan shall be rubber mounted to prevent the transmission of structural vibration and will include a baffle to diffuse audible noise. A switch shall be provided in the car-operating panel to control the fan.

J. Handrail: Handrails shall be provided on the side and rear walls of the car enclosure. Handrails shall be 1-1/2-inch-diameter.

K. Threshold: Extruded Aluminum.

L. Emergency Exit Contact: An electrical contact shall be provided on the car-top exit.

M. Guides: Car roller type guides at the top and the bottom.

N. Platform: Car platform shall be constructed of metal.

O. Certificate frame: Provide a Certificate frame with a satin stainless-steel finish.

P. The LED ceiling lights and the fan should automatically shut off when the system is not in use and be powered back up after a passenger calls the elevator and pushes a hall button.

2.5 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

A. Car Operating Panel: A car operating panel shall be provided which contains all push buttons, key switches, and message indicators for elevator operation. The car operating panel shall have a satin stainless-steel finish.

B. A car operating panel shall be furnished. It shall contain a bank of round stainless steel, mechanical LED illuminated buttons. Flush mounted to the panel and marked to correspond to the landings served. All buttons to have raised numerals and Braille markings with:

C. Flat Flush Mounted satin stainless-steel button with blue or white LED illuminating halo.

D. The car operating panel shall be equipped with the following features:
   1. Raised markings and Braille to the left-hand side of each push-button.
   2. Car Position Indicator at the top of and integral to the car operating panel.
   3. Door open and door close buttons.
   4. Inspection key-switch.
   5. Elevator Data Plate marked with elevator capacity and car number.
   6. Help Button: The help button shall initiate two-way communication between the car and a location inside the building, switching over to another location if the call is unanswered, where personnel are available who can take the appropriate action. Visual indicators are provided for call initiation and call acknowledgement.
   7. Audio/visual 2-way communication to be provided per code requirements.
   8. Landing Passing Signal: A chime bell shall sound in the car to signal that the car is either stopping at or passing a floor served by the elevator.
   9. In car stop switch (toggle or key unless local code prohibits use).
   10. Firefighter's hat (standard USA).
   11. Firefighter's Phase II Key-switch (standard USA).
   12. Call Cancel Button (standard USA).
   13. Firefighter's Phase II Emergency In-Car Operating Instructions: Worded according to A17.1 2000, Article 2.27.7.2.

E. Car Position Indicator: A digital, LED car position indicator shall be integral to the car operating panel.

F. Integral Hall fixtures shall feature round stainless steel, mechanical buttons marked to correspond to the landings. Hall fixtures to be located in the entrance frame face or the wall. Buttons shall be in vertically mounted fixture. Fixture shall be satin stainless steel or Gold Satin finish.

G. Button Options:
   1. Flat Flush Mounted satin stainless steel button with blue or white LED illuminating halo or gold satin button with white LED illuminating halo.

H. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors open, the lantern shall indicate the direction in which the car is to travel and a chime will sound.

I. Access key-switch at lowest floor in entrance jamb.

PART 3 EXECUTION

3.1 PREPARATION

A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Installation of all elevator components except as specifically provided for elsewhere by others.

3.3 DEMONSTRATION

A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly.

END OF SECTION

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SECTION 210400

COMMON REQUIREMENTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.1 SUMMARY

A This section describes the general requirements of these specifications and shall apply to all phases of the work specified, shown on the drawings, or required to provide for complete installation of all systems for this project.

B This Section includes the following basic materials and methods to complement other Division 21 Sections.

1.2 SCOPE

A The entire building shall have fire protection sprinkler system installed to meet the requirements of the NFPA codes, State Fire Marshal's office, Owner's approving insurance agency and all Authorities Having Jurisdiction.

B Contractor shall coordinate the locations of all ceiling mounted sprinkler heads to avoid any and all interference with all other trades.

C If conflicts do occur such that lights, ducts, diffusers, grilles, or ceiling systems cannot be installed in their required locations due to sprinkler piping interference, the piping shall be relocated or rerouted at no additional expense to the project.

D Contractor shall maintain an adequate supply of extra piping, fittings, and necessary tools to make field modifications without delay.

E An approved sprinkler shop drawing does not preclude rerouting if so ordered by the Architect.

1.3 WARRANTIES

A Warrant all materials, workmanship and equipment against defects for a period of one year after the date of substantial completion.

B Certain equipment shall be warranted beginning at the time of final acceptance or for longer periods of time as specified in those divisions of the Project Manual.

C Repair or replace, at no additional cost to the Owner, any item which may become defective within the warrant period.

D Any manufacturers' warranties concerning any item installed will run to the benefit of the Owner.

E The Contractor agrees not to void or impair, or to allow Sub-Contractors to void or impair, any warranties regarding products or items installed as part of this project.

F The repair of faulty workmanship shall be considered to be included in the contract.

1.4 ALTERNATES

A Alternates as shown on the drawings.

1.5 QUESTIONS OF INTERPRETATION DURING BIDDING PHASE

A If questions arise during the bidding process regarding the meaning of any portion of the contract documents, the prospective bidder shall submit the questions to the Architect for clarification.

B Any definitive interpretation or clarification of the contract documents will be published by addenda, properly issued to each person holding documents, prior to the bid date.

C Verbal interpretation or explanation not issued in the form of an addendum shall not be considered part of the bidding documents.

D When submitting questions for clarification, adequate time for issuance and delivery of addenda must be allowed.

E The Architect shall be the sole judge regarding interpretations of conflicts within contract documents.

1.6 CONTRACT DOCUMENT DISCREPANCIES

A If any ambiguities should appear in the contract documents, request clarification from the Architect before proceeding with the work.

B If the Contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out the work in a manner satisfactory to the Architect.

C Should a conflict occur within the contract documents, the Contractor is deemed to have estimated the more expensive way of doing the work unless a written clarification from the Architect was requested and obtained before submission of proposed methods or materials.

D The Architect shall be the sole judge regarding interpretations of conflicts within contract documents.

1.7 DEFINITIONS

A The following definitions shall apply throughout the contract documents:
1. Architect: Architect or Engineer
2. Code: All applicable national, state and local code
3. Mechanical: All plumbing, HVAC, & fire protection work required by the Contract Documents
4. Electrical: All electrical and fire alarm work required by the Contract Documents
5. Contractor: Any Contractor performing work required by the Contract Documents
6. Indicated: Noted, scheduled or specified
7. Selected: Selected by the Architect or Engineer
8. Provide: Furnish, install, connect and tested complete and ready for use

9. Furnish: Supply and deliver to the site ready for installation
10. Install: Install complete, per Contract Documents and manufacturer's requirements.
11. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
12. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
13. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations and in parking garages.
14. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
15. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
16. Dry Locations: A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.
17. Damp Locations: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.
    a. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.
18. Wet Locations: Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

1.8 SYMBOLS

A Items of equipment and materials are indicated on the drawings in accordance with the symbols shown on the plans.

1.9 ABBREVIATIONS

A Refer to abbreviations list shown on the Drawings.

B The following abbreviations apply throughout the Contract Documents:
1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. ADA: Americans with Disabilities Act
3. AHJ: Authority Having Jurisdiction
4. AMCA: Air Moving Council of America
5. ANSI: American National Standards Institute
6. ARI: American Refrigeration Institute
7. ASHRAE: American Society of Heating, Refrigerating and Air Conditioning Engineers
8. ASME: American Society of Mechanical Engineers
9. ASTM Specification: Standard specifications of the American Society for Testing Materials
10. CPVC: Chlorinated polyvinyl chloride plastic.

11. CR: Chlorosulfonated polyethylene synthetic rubber.
12. EPDM: Ethylene propylene diene terpolymer rubber.
13. FM: Factory Mutual Engineering Corporation
14. IRI: Industrial Risk Insurers
15. NEC: National Electrical Code, latest edition
16. NEMA: National Electrical Manufacturers Association
17. NFPA: National Fire Protection Association
18. NP: Nylon plastic.
19. NPS: Nominal Pipe Size
20. PE: Polyethylene plastic.
21. PVC: Polyvinyl chloride plastic.
22. SMACNA: Sheet Metal and Air Conditioning Contractors National Association
23. UL or Underwriters: Underwriters Laboratories, Inc.

1.10 CODES

A The work shall be performed by persons skilled in the trade involved and shall be done in a manner consistent with normal industry standards.

B All work shall conform to all applicable sections of currently adopted editions of the following codes, standards, and specifications:
1. International Building Code (IBC)
2. International Fire Code (IFC)
3. International Energy Conservation Code (IECC)
4. International Fuel Gas Code (IFGC)
5. Uniform Plumbing Code(UPC)
6. International Mechanical Code (IMC)
7. Safety and Health Regulations for Construction
8. Occupational Safety and Health Standards (OSHA), National Consensus Standards and Established Federal Standards
9. National Electrical Code (NEC)
10. National Fire Protection Association (NFPA)
11. American Gas Association (AGA)
12. Underwriters' Laboratories, Inc. (UL)
13. National Electrical Safety Code (NESC)
14. All applicable national, state and local codes and amendments.

1.11 PERMITS

A The Contractors shall familiarize themselves with all requirements regarding all permits, fees, etc., and shall comply with them.

B All permits, licenses, inspections and arrangements required for the work shall be obtained by the Contractor at his expense.

C All utilities shall be installed in accordance with the local rules and regulations and all charges shall be paid by the Contractor.

1.12 CODE COMPLIANCE

A Work shall be in accordance with all applicable codes. Where the codes and drawings do not agree, the code shall take precedence; however, code shall take precedence over what is shown only when it is more stringent than that indicated. Items that are allowed by codes which are less stringent than that shown on the drawings shall not be substituted.

B Where the National Electrical Code or applicable codes require controllers to be marked with a Short Circuit Current Rating (SCCR), the equipment shall be manufactured as required such that the SCCR of the equipment meets or exceeds the available short circuit current at the equipment.

1.13 MATERIALS AND EQUIPMENT MANUFACTURERS

A Options in selecting materials and equipment are limited by requirements of the contract documents and governing regulations. They are not controlled by industry traditions or procedures experienced on previous construction projects.

B Materials and equipment shall be provided in accordance with the following:
1. Primary Design Products: Primary design products are those products around which the project was designed in terms of capacity, performance, physical size and quality.
2. Primary design products are indicated by use of a single manufacturer's name, model number or similar data on drawings or schedules or within the specifications.
3. Provide primary design products unless substitutions are made in accordance with the following paragraphs.
4. Acceptable Equivalent Substitutions: Acceptable equivalent substitutions are products of manufactures other than those listed for the primary design products. Equivalent acceptable substitutions shall meet each of the following requirements:
    a. The product shall be manufactured by one of the acceptable manufacturers listed in the Project Manual, drawings, or addenda.
    b. The product shall meet or exceed the requirements of the contract documents in terms of quality, performance, suitability, appearance, and physical characteristics.
    c. The Contractor providing the substitution shall bear the total cost of all changes due to substitutions. These costs may include additional compensation to the Architect for redesign and evaluation services, increased cost of work by the Owner or other Contractors, and similar considerations.
5. Performance Requirements: Where the contract documents list performance requirements or describe a product or assembly generically, provide products that comply with the specific requirements indicated and that are recommended by the manufacturer for the respective application.
6. Compliance with Standards, Codes and Regulations: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including the standards, codes and regulations.

C Proposed substitutions will be judged on the basis of quality, performance, appearance and on the governing space limitations. The reputation of the manufacturer, delivery time requirements, and the availability of repair or replacement parts may also be considered.

D The Architect shall be the sole and final judge as to the suitability of substitution items.

1.14 SUBMITTALS

A Shop Drawings, Product Data and Samples:

1. Other section in the Project Manual shall be adhered to if more stringent than the following paragraphs.
2. When required by other sections of this Project Manual, submit shop drawings, product data or samples to the Architect for review.
3. Submittals deemed unnecessary by the Architect shall be returned indicating “No Action Taken”.
4. A completed copy of the transmittal form included with the Project Manual shall accompany each submittal.
5. The shop drawing submittals shall be numbered consecutively under Specification Section 210400. The submittal subject shall clearly summarize the area or system being issued for review.
6. The product data submittal ID shall be numbered consecutively under the applicable Project Manual section, ending with the revision number. The submittal subject shall be the product data description.
    a. For example, the first revision of the second submittal for product data specified in section 211300 shall have an ID of ‘211300-002-1’.
7. Submittals for products not listed in the Project Manual shall reference the respective contract document.
8. Unless otherwise noted, submit one copy electronically of shop drawings and product data for review. Review comments will be returned electronically. A hard copy of the electronic submittal will be returned if requested.
    a. Shop drawings and product data shall be in original searchable PDF format.
9. Where samples are required, submit one (1) sample of each required item.
10. Shop drawings are drawings, diagrams, schedules and other data specifically prepared for this project by the Contractor, Manufacturer, Supplier, or Distributor to illustrate some portion of the work. Shop Drawings shall also detail fabrication and installation for metal and wood supports and anchorage for fire protection materials and equipment.
    a. Shop drawings shall be drawn to accurate scale and of adequate size to illustrate required details.
    b. Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals.
    c. Indicate installation, layout, weights, volumes, mounting and support details, and piping connections.
    d. Hydraulic calculations associated with the shop drawings shall be packaged in the same submittal.
    e. Submit final shop drawings to Authorities Having Jurisdiction for approval.
11. Shop drawings shall include a completed and signed Owner's Information Certificate as required by NFPA. This certificate shall also be included with the documents issued to the AHJ for approval.
12. Product data are illustrations, standard schedules, performance charts, instruction brochures, diagrams and other information furnished by the Contractor, Manufacturer,

Supplier, or Distributor to illustrate a material, product or system for some portion of the work.

13. Samples are physical examples furnished by the Contractor, Manufacturer, Supplier, or Distributor to illustrate materials, equipment or workmanship and to establish the standards by which the work will be performed.
14. All submittals shall clearly indicate proposed items, capacities, characteristics and details in conformance with contract documents. All equipment items shall be marked with the same item number as used on drawings or schedules. Capacities, dimensions and special features required shall be certified by the manufacturer.
15. Submittals shall indicate manufacturer's delivery time for the item after review by the Architect.
16. The Architect shall review or take other appropriate action upon the Contractor's submittals such as shop drawings, product data and samples, but only to determine conformance with the design concept of the work and the information given in the contract documents.
17. Contractor shall not be relieved of responsibility for any deviation from the requirements of the contract documents by the Architect's review of shop drawings, product data or samples.
18. Contractor shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect's review of those drawings.

B Coordination Drawings: Detail major elements, components, and systems of fire protection equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work. Drawings shall include the following:

1. Planned piping layout, including valve and specialty locations and valve-stem movement.
2. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
3. Equipment and accessory service connections and support details.
4. Sprinklers shall be referred on the drawings with the Sprinkler Identification Number (SIN) or Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.
5. Exterior wall and foundation penetrations.
6. Fire-rated wall and floor penetrations.
7. Sizes and location of required concrete pads and bases.
8. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
9. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
10. Reflected ceiling plans to coordinate and integrate installation of fire protection devices with air outlets and inlets, light fixtures, communication system components, and other ceiling-mounted items.
11. All Contractors are required to provide information concerning their part of the work needed to develop the coordination drawings.
12. Drawings shall contain all of the following that are applicable:
    a. Fire sprinklers and piping
    b. Ductwork, equipment, and terminal devices (showing access and service requirements).
    c. Plumbing

d. Structure and general construction
e. HVAC piping
f. Bus duct
g. Recessed light fixtures
h. Electrical conduit 2 inches and larger
i. Cable tray
j. Wet vacuum system
k. Other areas indicated by the Contractor that involve congestion

13. Complete drawings after submitting product data on items included in coordination drawings.

C Approved Fire Protection Drawings:

1. Working plans and hydraulic calculations, prepared according to NFPA, that have been reviewed and approved by all authorities having jurisdiction and Owner's insurance carrier.

D The Subcontractor shall provide fire-hydrant flow test as a basis for hydraulically calculated systems. Testing shall be conducted at a location representative of the actual future system(s) supply and be no more than 12 months old at date of submission. The flow test report shall have, as a minimum, the following:

1. Contractor’s name and contact information.
2. Project name.
3. Date, time and location of flow test.
4. Static pressure (psi).
5. Residual pressure (psi).
6. Water flow measurement (gpm).
7. Elevation of hydrant(s) tested (feet above sea level).

E Operation and Maintenance Manuals:

1. Prepare electronic operation and maintenance manuals for the equipment furnished.
2. The manual shall be in original searchable PDF format with equipment organized by specification section. Bookmarking shall be provided in the PDF for each specification section and piece of equipment.
3. Manuals shall be submitted to the Architect for review and distribution to the Owner not less than 30 days prior to substantial completion of the project.
4. Manuals not meeting the requirements of this section may be rejected by the Architect.
5. Manual shall include, but shall not be limited to, the following:
   a. A cover page including:
      1) Project name and address
      2) Division of work covered by the manual
      3) Name, address and telephone number of Contractor and all Sub-Contractors including night or emergency numbers
   b. A Complete Index. Contractor may submit the index to the Architect for review prior to submittal of complete manuals if desired.
   c. Manufacturer's equipment product data, O&M manuals and parts lists identified by the equipment mark used in the contract drawings.
   d. Names, Addresses and Telephone Numbers. This list shall include the manufacturer and local representative who stocks or furnishes repair parts for all items of equipment and shall be typed on a single page in front of the manual.

e. Startup, Operation and Shutdown Procedures. Provide a written description of procedures for startup, operation and shutdown of each fire protection item or system. This description shall include motors to start, valves to open, etc., in proper sequence, and the location of switches, starters, pushbuttons and valves. Description shall include item references or labels used in the contract documents unless otherwise instructed in advance by the Owner.
f. Seasonal Changeover Procedure. Provide a written description of the procedure for necessary seasonable changeover from heating to cooling and vice versa.
g. Equipment Accessory Schedule. Upon completion of the work, furnish the Owner with a complete equipment accessory schedule listing each piece of equipment and the related size, type, number required and the manufacturer of all renewable items.
h. Lubrication Schedule. Provide a chart listing each piece of equipment, the proper type of oil or grease required, and recommended frequency of lubrication.
i. Emergency Procedures. Provide a written description of emergency operating procedures or a list of service organizations (including addresses and telephone numbers) capable of rendering emergency services to the various parts of the system.
j. One copy of all shop drawings.
k. Signed letters of certification of inspection and similar information.
l. All manufacturers' warranty information.
m. Provide documentation that training was performed for each item specified to include Owner training. Include name of Owner’s representative(s) present, date and time of training.
n. Normal Maintenance Schedule. Include a listing of work to be performed at various time intervals; i.e., 30, 90, 180 days and yearly.
o. Provide documentation that Extra Materials were received by the Owner for each section requiring Extra Materials.
p. Motor List. The list shall indicate motor location, equipment served (using labels indicated on drawings), horsepower, electrical characteristics, motor type, and rpm. Motors less than 1/2 horsepower need not be included.

F Division 21 Specific Submittals
1. Product Data For the following:
a. Transition fittings.
b. Dielectric fittings.
c. Pipe flashing hood.
d. Access doors.
2. Welding certificates.
3. Coordination Drawings: For access panel and door locations.

1.15 OPERATING TRAINING

A Complete operating instructions for each system and item of equipment shall be provided to the Owner's designated personnel.

B Operation and Maintenance Manuals must be reviewed and accepted by the Architect and provided to the Owner prior to operating training.

C Training shall be scheduled at the convenience of the Owner. A minimum of 2 hours of training shall be provided.

D Training shall include instructions on the following:
1. Startup and shutdown procedures
2. Seasonal changeover
3. Periodic maintenance
4. Emergency operation
5. Safety

E In addition to the instructions required above, wherever possible perform the operations being described in order to fully illustrate system operation.

F At the completion of training, turn over to the Owner all required keys and special tools for installed equipment. Each key or tool shall be labeled with its use.

1.16 QUALITY ASSURANCE

A Steel Support Welding: Qualify processes and operators according to AWS D1.1, “Structural Welding Code-Steel”.

B Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, “Welding and Brazing Qualifications”.
1. Comply with provisions in ASME B31 Series, “Code for Pressure Piping”.
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C Electrical Characteristics for Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

D Each individual Fire Protection component (including fire sprinklers, piping, couplings, fittings, valves and accessories) shall be supplied by one manufacturer and shall be UL listed .

1.17 DELIVERY, STORAGE, AND HANDLING

A Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B Store CPVC pipe protected from direct sunlight. Support to prevent sagging and bending.

1.18 COORDINATION

A Drawings, plans, schematics and diagrams indicate the general location and the arrangement of systems. Wherever practical, install systems as indicated.

B Provide offsets and elevation changes in piping, conduit and ductwork as required to complete the Layout and Coordination Process. Offsets and elevation change information shall be indicated in the coordination process documentation and must be submitted for review.

C Arrange for spaces, chases, slots, and openings in building structure during progress of construction to allow for system installations.

D Coordinate arrangement, mounting, and support of equipment.
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.

E Coordinate routing of all piping in open and exposed areas with light fixture locations. Where piping will be installed at or below the mounting height of lights, piping shall not pass directly below or within a proximity that will create an obstruction to the required light pattern. Deviations and/or conflicts discovered in the field shall be resolved, to owner/architect/engineer satisfaction, at no additional cost to the project.

F Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the installations that follow.
1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

G Sequence, coordinate, and integrate installing materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

H Coordinate service connections to components furnished by utility companies.
1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing water, gas, electrical power and other services.

I Coordinate location of access panels and doors for items that are concealed by finished surfaces.

J Coordinate testing of items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

1.19 STRUCTURAL COORDINATION

A Where pipes are routed vertically through shafts, the Subcontractor shall furnish and install all necessary miscellaneous structural members to support the loads imposed by the risers.

B In cases where the Contractor determines that superimposed loads such as suspended or floor mounted fire protection, mechanical, electrical, plumbing system or equipment exist which

exceed design loads indicated on structural contract documents, Contractor shall submit load data to Design Professionals for review prior to proceeding with work.

C Distribute the maximum load hung from any structural member for fire protection, mechanical, electrical, plumbing, ductwork, piping, etc. over the member's tributary area in a way that the design superimposed dead loads listed in structural contract documents are not exceeded. The Contractor shall coordinate the loads and provide additional support or distribution framing as required achieving the allowable load distribution.

D Connections of systems designed by Contractor's engineer such as, but not limited to fire protection, mechanical, electrical, plumbing loads are assumed to impose vertical and/or horizontal loads on the base building structural members without generating torsion in the supporting structural members. Contractor is responsible for furnishing and installing all supplementary bracing members as required to prevent torsion on the base building structure.

E Coordinate locations of new fire suppression, plumbing and HVAC penetrations through existing structure and construction. Utilize all existing documentation of conditions for coordination. Verify penetrations utilizing GPR (Ground Penetrating Radar) as necessary to confirm penetration locations.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Equipment Schedules and/or notes with Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 EQUIPMENT SHORT CIRCUIT CURRENT RATING

A Where the National Electrical Code or applicable codes require equipment to be marked with a Short Circuit Current Rating (SCCR), the equipment shall be manufactured as required such that the SCCR of the equipment meets or exceeds the available short circuit current at the equipment. Acceptable methods of complying with this requirement are as follows:

1. Provide SCCR rating at the equipment that meets or exceeds the available short circuit current at the switchboard or panelboard where the equipment circuit originates.
2. Provide calculations, based on the available short circuit current at the switchboard or panelboard where the equipment circuit originates, that document the actual short circuit current available at the equipment. The SCCR rating of the equipment shall meet or exceed this calculated value.

2.3 MATERIALS

A Unless otherwise specified, all materials and equipment shall be new, unused and undamaged. Materials and equipment shall be the current and standard designs of manufacturers regularly engaged in their production.

2.4 MATERIALS AND EQUIPMENT FURNISHED BY OTHERS

A Where materials and equipment are indicated as furnished by others and installed or connected under this contract, it shall be the Contractor's responsibility to verify installation details and requirements.

2.5 QUANTITY OF SPECIFIED ITEMS REQUIRED

A Wherever in these specifications an article, device or piece of equipment is referred to in the singular number; such reference shall apply to as many such articles as are shown on the drawings or required to complete the installation.

2.6 PIPE AND PIPE FITTINGS

A Refer to individual piping Sections for pipe and fitting materials and joining methods.

B Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

C Fusion-weld joints shall be made in accordance with the pipe and fitting manufacturer’s specifications and product standards.
1. Fusion-weld tooling, welding machines, and electrofusion devices shall be as specified by the pipe and fittings manufacturer.
2. Pipe and fittings shall be prepared in accordance with ASTM F 2389 and the manufacturer’s specifications.
3. Joint preparation, setting and alignment, fusion process, cooling times and working pressure shall be in accordance with the pipe and fitting manufacturer’s specifications.

2.7 JOINING MATERIALS

A Refer to individual piping sections for special joining materials not listed below.

B Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.
   a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
   b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

F Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H Solvent Cements: Manufacturer's standard solvent cements for the following:
1. CPVC Piping: ASTM F 493.

I Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

J Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.

K Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

2.8 TRANSITION FITTINGS

A AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
1. Manufacturers:
   a. Cascade Waterworks Mfg. Co.
   b. Dresser Industries, Inc.; DMD Div.
   c. Ford Meter Box Company, Incorporated (The); Pipe Products Div.
   d. JCM Industries.
   e. Smith-Blair, Inc.
   f. Viking Johnson.
   g. Or pre-approved equal.
2. Underground Piping NPS 1-1/2 and Smaller: Manufactured fitting or coupling.
3. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.
4. Aboveground Pressure Piping: Pipe fitting.

B Plastic-to-Metal Transition Fittings: CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.

C Plastic-to-Metal Transition Unions: MSS SP-107, CPVC four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
1. Manufacturers:
   a. NIBCO, Inc.
   b. NIBCO, Inc.; Chemtrol Div.

2.9 DIELECTRIC FITTINGS

A General: Assembly or fitting with insulating material isolating joined dissimilar metals, to prevent galvanic action and stop corrosion. Dielectric unions shall not be used.

B Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.

C Insulating Material: Suitable for system fluid, pressure, and temperature.

D Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
1. Manufacturers:
   a. Central Plastics Co.
   b. Watts Industries, Inc.; Water Products Div.

E Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
1. Manufacturers:
   a. Calpico, Inc.
   b. Central Plastics Co.
2. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig minimum working pressure as required to suit system pressures.

F Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 degrees F.
1. Manufacturers:
   a. Calpico, Inc.
   b. Lochinvar Corp.

G Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 degrees F.
1. Manufacturers:
   a. Grinnell Corp.; Grinnell Supply Sales Co.
   b. Victaulic Co. of America.

2.10 SEALANTS AND FIRESTOPPING

A Manufacturers:
1. Sealants:
   a. Dow Corning
   b. Pecora
   c. Sonneborn
   d. Tremco
2. Firestopping Materials and Systems:
   a. A/D Fire Protection Systems Inc: www.adfire.com.
   b. 3M Fire Protection Products: www.3m.com/firestop.

c. Hilti, Inc: www.us.hilti.com.
d. Nelson FireStop Products: www.nelsonfirestop.com.
e. Specified Technologies, Inc: www.stifirestop.com.
f. Tremstop Fyre-Sil Sealant - Tremco Sealants & Coatings

B Silicone Sealant: Single component, air curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging type for application in vertical joints and in horizontal joints, color as selected.

C Primer: Non-staining type, recommended by sealant manufacturer to suit application.

D Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

E Joint Backing: ANSI/ASTM D1056; round, closed cell, polyethylene foam rod; oversized 30% to 50% larger than joint width.

F Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

G Firestopping Materials and Systems:
1. Subject to compliance with the requirements of Division 07 Fire and Smoke Protection.

2.11 ACCESS DOORS

A Manufacturers:
1. Access Doors:
a. J. L. Industries
b. Karp Associates, Inc.
c. Larsons Mfg. Co.
d. Milcor, Inc.
e. Miller Limited Partnership
f. Nystrom, Inc.
g. Or pre-approved equivalent

B Prime coated 14 gauge steel, flush, with screwdriver operated cam lock, frame to accommodate construction type; size as indicated.

2.12 ELECTRICAL WIRE

A All wiring materials covered by this section shall be in accordance with the latest revision of the National Electrical Code and applicable local codes and shall carry the UL label where applicable.

B All wiring running exposed in return air plenums shall be plenum-rated cable for fire and smoke spread.

2.13 LOW VOLTAGE CONTROL WIRE AND CABLE

A 24 VAC, and General Purpose Cabling:
1. Cable shall consist of copper conductors not less than #18 AWG stranded.

2. Cable shall be two- or three-conductor twisted cable with a drain wire.
3. Cable shall have a 100 percent overall shield.
4. Cable shall be plenum rated.
5. Cable shall meet or exceed NEC voltage rating of 300 volts.
6. Cable shall be NEC type CMP.
7. Cable shall meet or exceed UL temperature rating of +60 deg C.
8. Cable shall be labeled at a minimum of every 18 inches with the system manufacturer's name and the type of signal carried within the cable, i.e., analog input, analog output, binary input, binary output, 24 VAC.

B Approved Manufacturers: Windy City Wire, Southwest Wire, or pre-approved equivalent.

PART 3 - EXECUTION

3.1 GENERAL

A Fabrication, erection, and installation of the complete system shall be done by qualified personnel experienced in such work and shall proceed in an orderly manner so as not to hold up the progress of the project.

B Check all areas and surfaces where equipment or materials are to be installed and report any unsatisfactory conditions before starting work.

C Commencement of work signifies the Contractor's acceptance of the conditions as fit and proper for the execution of the fire protection work.

D Equipment and systems shall be installed in accordance with manufacturer's instructions, requirements, or recommendations.

E Coordinate location of fire sprinkler piping and heads with all trades prior to finalization of shop drawings and hydraulic calculations.

F See architectural reflected ceiling plans for locations of all ceiling mounted devices.

G Do not run fire sprinkler piping above electrical panels or in code required clearance spaces. Coordinate with electrical, plumbing and mechanical contractors.

H The only fire protection piping allowed in elevator machine rooms, electrical rooms, telecom rooms and associated riser rooms is the branch line serving the sprinklers protecting that specific space. Fire protection piping may not pass through these rooms to serve other spaces.

I Coordinate shut down of existing fire service with Owner's representative.

J All work shall comply with NFPA and the local AHJ (Authorities Having Jurisdiction), and Owner's insurance carrier.

3.2 DELIVERY AND STORAGE OF MATERIALS

A Take provisions for the delivery and safe storage of materials and shall make the required arrangements with other Contractors for the introduction into the building of equipment too large to pass through finished openings.

B Materials shall be delivered at such stages of the work as will expedite the work as a whole and shall be marked and stored in such a way as to be easily checked and inspected.

C All items subject to cold weather damage shall be protected by covering, insulating, or storing in a heated space.

3.3 COOPERATION WITH OTHER CONTRACTORS

A Perform the work in conformance with the construction called for by other trades and afford other Contractors reasonable opportunity for the execution of their work.

B Properly connect and coordinate the work with the work of other Contractors at such time and in such a manner as not to delay or interfere with their work.

C Examine the contract documents for the General, Mechanical, and Electrical work and the work of other trades. Coordinate work accordingly.

D Promptly report to the Architect any delay or difficulties encountered in the installation of the fire protection work which might prevent prompt and proper installation of work required from other trades.

3.4 COORDINATION OF WORK

A The list below is the precedence of assigned work items for space priority in descending order. Items not listed shall have the same precedence as similar items.
1. Reflected ceiling with all light fixtures, access above light fixtures required for maintenance, sprinkler head locations, and all ceiling fixtures and devices.
2. Space designed for future utility placement.
3. Gravity flow plumbing waste, roof drainage, and other systems that rely upon gravity for flow.
4. Ductwork and appurtenances, except that external bracing shall be relocated to accommodate local interference.
5. Fire sprinkler piping.
6. Cable tray with access identification 8 inches horizontal to 6 inches above tray.
7. Electrical conduit over 2 inches in diameter.
8. HVAC piping except for pressurized domestic water piping.
9. Refrigerant safety relief piping.
10. Plumbing vents.
11. Electrical conduit under 2 inches in diameter.

B Plan all work so it proceeds with a minimum of interference with other trades.

C It shall also be the responsibility of the Contractor to inform all contractors of all openings required in the building construction for the installation of the fire protection work.

D The Contractor shall cooperate with all other contractors in furnishing material and information, in proper sequence, for the correct location of all sleeves, inserts, foundations, wiring, etc.

E Provisions shall be made for all special frames, openings, and sleeves as required.

F The Contractor shall pay for extra cutting and patching made necessary by his failure to properly direct such work at the correct time.

3.5 ELECTRICAL WIRING

A Install wiring in accordance with National Electric Code, ANSI/NFPA 70.

B Install wiring (low and line voltage) in metal raceways or conduit unless inside control cabinet or unit enclosures. For concealed and accessible areas, plenum-rated wiring and cabling may be used.

C Class 2 wiring not installed in conduit shall be supported every five feet from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements. Exposed wiring shall only be allowed in concealed accessible locations.

D Low voltage control wiring and 24 VAC can be run in the same conduit. Power wiring 120 VAC and greater must be in a separate conduit.

E Fastening shall be secured to walls or ceilings by means of appropriate screws, expansion screws anchors, toggle bolts, hollow wall screw anchors, nylon expansion anchors, or expansion shields. All-purpose plastic anchors are not acceptable.

F Control panels shall be mounted on vibration-free walls or freestanding structural supports. Panels shall be located as indicated or approved by the Owner's Representative.

G Locate circuits, relays, transformers, or other equipment that contains or must be connected to voltages exceeding 130 volts, in separate cabinets, which may be adjacent to control panels; permanently label "DANGER 277 VOLTS" or appropriate volts.

H All wiring in mechanical rooms shall be in conduit. Minimum control wiring conduit size shall be 3/4 inch.

3.6 CONTROL WIRING

A Provide all incidental control wiring required to make the equipment or systems fully operational. Coordinate with equipment manufacture incidental wiring requirements.

B Incidental control wiring includes but not limited to:
1. Fire and Jockey Pumps
2. Air Compressors

3. Pre-Action System Control Panels
4. Equipment Motors Starters
5. Pushbutton Stations and Emergency Stop Switches
6. Remote Monitoring and Control Panels (Provided by Equipment Manufacturers)
7. Unit Mounted Motor Starters, Contactors, Disconnect Switches, Thermal Overloads and Heaters
8. Variable Frequency Controls.

3.7 LAYING OUT WORK

A Carefully lay out all work in advance of installation using data and measurements from the site, the appropriate architectural and structural drawings, and shop drawings.

B Equipment layout and all system layouts shall confirm adequate clearances for installation, operation, maintenance, and code-required clearances from the structure or other equipment and systems.

C Provide offsets and elevation changes in piping and conduit as required to complete the Layout and Coordination Process. Offsets and elevation change information shall be indicated in the coordination process documentation and must be submitted for review.

D The layout shall not cause problems of operation, maintenance, or clearance for items installed by other Contractors.

E Prior to installation of any work, make certain the location does not conflict with other items in or near the same location.

F If the layouts so prepared indicate that the required conditions cannot be met in the space provided, inform the Architect prior to installation and shall request clarification.

G Failure to properly coordinate and lay out the work will require correction by the Contractors at their own expense.

3.8 DATA AND MEASUREMENTS

A Drawings are diagrammatic or schematic. Do not scale drawings.

B The data given herein and on the drawings is as accurate as could be secured; absolute accuracy is not guaranteed.

C Obtain exact locations, measurements, levels, etc., at the site and shall adapt their work to actual conditions.

D Examine the general construction, mechanical, electrical, and other applicable drawings and the Specifications.

E Only architectural drawings, structural drawings, and site measurements may be utilized in calculations.

F Layout and coordinate all work prior to installation to provide clearances for operation, maintenance and codes. Verify non-interference with other work.

3.9 POSITION OF DEVICES

A Locate devices mounted on finished surfaces with regard to paneling, furring, trim, etc. Where several devices occur in a room, they shall be symmetrically arranged as reviewed by the Architect.

B Devices improperly located or installed shall be repaired, replaced or relocated at the Contractor's expense.

C Devices shall be set plumb or horizontal and shall extend to the finished surface of the wall, ceiling, or floor without projecting beyond the surface.

D Devices shown on wood trim, cases, or other fixtures shall be installed symmetrically and, where necessary, shall be set with the long dimension of the plate horizontal.

E Coordinate their respective devices so as not to destroy the aesthetic effect of the surface in which the devices are mounted.

F Coordinate the locations of all items with work furnished by other trades to avoid interference.

G If the required coordination is not done, the outlets or devices shall be removed and relocated if so directed by the Architect and the damaged surfaces repaired at the Contractor's expense.

H Devices shall be installed at the height noted or required by code. All heights of devices are measured from finished floor to centerline of device.

3.10 PROTECTION OF APPARATUS

A Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment, and installations from damage of any kind.

B Failure to provide such protection to the satisfaction of the Architect shall be sufficient cause for the rejection of any particular piece(s) of material, apparatus, equipment, etc., concerned.

3.11 ACCESS TO EQUIPMENT

A All motors, valves, control devices, specialties, etc., shall be located to provide for easy access for operation, repair and maintenance; if concealed, access doors shall be provided.

B Access doors required for access to equipment requiring inspection or service shall be provided.

C Provide all access doors not already furnished by other Contractors but which are required for access to fire protection equipment.

D Doors shall be 12 inches by 12 inches unless shown otherwise.

E Person access doors shall be 18 inches by 18 inches minimum.

3.12 SEALING OF EXTERIOR OPENINGS

A Openings around pipes, conduits, etc., in exterior walls above grade shall be sealed with polyurethane sealant.

B Preparation:
1. Clean and prepare joints in accordance with manufacturer's instructions.
2. Remove loose materials and foreign matter which might impair adhesion of sealant.
3. Verify that joint backing and release tapes are compatible with sealant.
4. Perform preparation in accordance with ASTM C804 for solvent release sealants.
5. Protect elements surrounding the work of this Section from damage or disfiguration.

C Installation:
1. Perform installation in accordance with ASTM C804 for solvent release sealants.
2. Install sealant in accordance with manufacturer's instructions.
3. Measure joint dimensions and size materials to achieve required width/depth ratios.
4. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.
5. Install bond breaker where joint backing is not used.
6. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
7. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
8. Tool joints concave.

3.13 PIPING SYSTEMS - COMMON REQUIREMENTS

A General: Install as described below, unless individual Sections specify otherwise. Individual Sections specify unique installation requirements.

B General Locations and Arrangements:
1. Drawing plans, schematics, and diagrams indicate general, diagrammatic location and arrangement of systems.
2. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
3. Install systems as indicated, unless deviations to layout are approved on Coordination Drawings.
4. Provide offsets and elevation changes in piping and conduit as required to complete the Layout and Coordination Process. Offsets and elevation change information shall be indicated in the coordination process documentation and must be submitted for review.
5. Refer to architectural reflected ceiling plans for exact diffuser, register, grille, and ceiling mounted device locations.
6. Do not run fire sprinkler piping above electrical or telecom panels or in code required clearance spaces. Coordinate with electrical, plumbing and mechanical contractors.
7. The only fire protection piping allowed in elevator machine rooms, electrical rooms, telecom rooms and associated riser rooms is the branch line serving the sprinklers protecting that specific space. Fire protection piping may not pass through these rooms to serve other spaces.

8. Coordinate location of piping with electrical cable tray. Provide a minimum of 6" of clear access above cable tray for installation of cables.
9. Install all horizontal piping in mechanical rooms at a minimum of 7'-6" above finished floor.
10. Install all wall mounted equipment at a minimum 7'-0" above finished floor or as required for service per manufacturers' recommendations.
11. Install exposed interior and exterior piping at right angles or parallel to building walls.
    a. Diagonal runs are prohibited, unless otherwise indicated.
12. Conceal piping in walls, pipe chases, utility chases, above ceilings, below grade or floors, unless otherwise noted, except in mechanical rooms or service areas.
13. Install piping free of sags or bends with ample space between piping to permit proper insulation applications if necessary.
14. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building unless otherwise indicated.
    a. Allow sufficient space above ceiling panels to allow for ceiling panel removal.
15. Install piping to allow for expansion and contraction without stressing pipe, adjacent building structure or connecting equipment.
    a. Install expansion loops or compensators where indicated.
16. Do not use ceiling support system to bear weight of devices or systems unless ceiling support system is certified as suitable to do so.
17. During construction, avoid any undue loads, forces or strains on valves, equipment, pumps flanges, or building elements with piping connections or piping systems.

C Contractor is responsible for any cutting and patching needed for installation. Patching must match existing.

D Install components with pressure rating equal to or greater than system operating pressure.

E Locate groups of pipes parallel to each other, spaced to permit insulation and valve servicing.

F Install fittings for changes in direction and branch connections.

G Keep all pipe and equipment openings closed during construction except when actual work is being performed on that item or system.

H Piping branch takeoffs shall be fabricated using standard manufactured welding or threaded or grooved tees.

I Leaking pipe joints shall be remade using new materials.

J Drill and deburr all openings which are made after erection of the piping system.
1. Joints in steel pipe 2 inches and smaller shall be threaded in accordance with ANSI B1.1.
2. Ream threaded ends to remove burrs and restore full inside diameter.
3. Utilize pipe joint lubricant or sealant suitable for the service for which the pipe is intended on the male threads at each joint.
4. Tighten joints to leave not more than three threads exposed.

K Pipe joints and steel pipe larger than 2 inches shall be welded in accordance with ASME Code for Pressure Piping B31.

L Flanges on steel pipe larger than 2 inches shall be welded in accordance with ASME B31. Clean flange faces and install gaskets.
1. Tighten bolts to torques specified by the manufacturer of the flange and flange bolts to provide uniform compression of gaskets.

M Joints in non-ferrous pipe shall be brazed or soldered.
1. Braze joints in accordance with ANSI B31.9 or B31.5.
2. Thoroughly clean tube surface and inside surface of the fitting using emery cloth. Clean tube and fittings and apply flux.
3. Flux shall not be used for cleaning tube and fitting surfaces.

N Joints for other piping systems are specified within the respective piping system specifications.

O Install couplings according to manufacturer's written instructions.

P Verify final equipment locations for roughing-in of all systems.

Q Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.14 PIPING JOINT CONSTRUCTION

A Join pipe and fittings as follows and as specifically required in individual piping specification Sections:
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Soldered Joints: Construct joints according to AWS's "Soldering Manual", Chapter "The Soldering of Pipe and Tube"; or CDA's "Copper Tube Handbook".
4. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
   a. Note internal length of threads in fittings or valve ends, and proximity of internal seat or wall, to determine how far pipe should be threaded into joint.
   b. Apply appropriate tape or thread compound to external pipe threads, unless dry seal threading is specified.
   c. Align threads at point of assembly.
   d. Tighten joint with wrench. Apply wrench to valve end into which pipe is being threaded.
   e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
6. Welded Joints: Construct joints according to AWS D10.12, "Recommended Practices and Procedures for Welding Low Carbon Steel Pipe," using qualified processes and welding operators according to "Quality Assurance" Article.
7. Flanged Joints: Align flange surfaces parallel. Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets

as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly using torque wrench.

8. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join pipe and fittings according to the following:
   a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
   b. CPVC Piping: ASTM D 2846 and ASTM F 493.

3.15 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire protection materials and equipment.

B Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.16 TESTING AND TEST REPORTS

A Upon completion of the work, the entire system shall be tested and proven for capacity of equipment, balance of system and proper operation of controls.
   1. Motors shall be checked for overload.
   2. Lubricate moving parts and clean or replace filters.
   3. Test piping systems per applicable codes and standards.
   4. Submit three (3) copies of all tests to the Architect for review prior to date of substantial completion.
   5. Equipment and systems discrepancies shall be corrected prior to final acceptance.

END OF SECTION

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SECTION 210500

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.1 SECTION INCLUDES

A Above ground piping and fittings.

B Mechanical couplings.

C Pipe hangers and supports.

D Pressure gauges.

E Documentation cabinet.

1.2 REFERENCE STANDARDS

A ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

B ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300.

C ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250.

D ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard.

E ASME B16.11 - Forged Fittings, Socket-Welding and Threaded.

F ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

A ASME B40.100 - Pressure Gauges and Gauge Attachments.

B ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators.

C ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.

D ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

E ASTM A135/A135M - Standard Specification for Electric-Resistance-Welded Steel Pipe.

F ASTM A536 - Standard Specification for Ductile Iron Castings.

G ASTM A795/A795M - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.

H ASTM B75/B75M - Standard Specification for Seamless Copper Tube.

I ASTM B75M - Standard Specification for Seamless Copper Tube (Metric); 1999 (Reapproved 2005).

J ASTM B88 - Standard Specification for Seamless Copper Water Tube.

K ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric).

L ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.

M ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

N ASTM F442/F442M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).

O ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

P AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

Q AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings.

R AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

S AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast.

T AWWA C606 - Grooved and Shouldered Joints.

U ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements.

V ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry.

W ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements.

X ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

Y NFPA 13 - Standard for the Installation of Sprinkler Systems.

Z UL (DIR) - Online Certifications Directory.

AA UL 393 - Indicating Pressure Gauges for Fire-Protection Service.

BB UL 393 - Indicating Pressure Gauges for Fire-Protection Services; Current Edition, Including All Revisions.

CC UL 2901B - Vapor Corrosion Inhibitors for Use in Fire Sprinkler Systems

1.3 SUBMITTALS

A Product Data:
1. Provide manufacturer's catalog information. Indicate material selections being provided, listing and ratings.
2. Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals.
3. Submit product data to Authorities Having Jurisdiction for approval when required by the local code. Submit proof of approval to the Architect/Engineer.

B Project Record Documents: Record actual locations of components and tag numbering.

C Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.4 QUALITY ASSURANCE

A Company specializing in manufacturing the Products specified in this section.

B Installer Qualifications: Company specializing in performing work of the type specified in this section.

C Conform to UL (DIR) requirements.

D Valves: Bear UL (DIR) product listing label or marking. Provide manufacturer's name and pressure rating marked on valve body.

E Each individual Fire Protection component (including fire sprinklers, couplings, fittings, valves and accessories) shall be supplied by one manufacturer and shall be UL listed .

F Products Requiring Electrical Connection: Listed and classified as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A Deliver and store valves in shipping containers, with labeling in place.

B Provide temporary protective coating on cast iron and steel valves.

C Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Sprinkler-based System:

1. Comply with NFPA 13.
2. See Section 211300.

B Welding Materials and Procedures: Comply with ASME BPVC-IX.

C Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.2 ABOVE GROUND PIPING

A Steel Pipe (base bid): ASTM A795 Schedule 10, ASTM A53 Schedule 40, ASTM A135/A135M Schedule 10, or ASTM A795 Schedule 40, black.
1. All piping shall have a Corrosion Resistance Ratio (CRR) greater than or equal to 1.00.
2. All piping used in dry sprinkler systems, preaction sprinkler systems, and dry standpipe systems shall be Schedule 40 black steel.
3. All piping installed where system pressure exceeds 300 psi shall be ASTM A 53 Schedule 40 Grade B seemless.
4. Steel Fittings: ASME B16.5 steel flanges and fittings or ASME B16.11 forged steel socket welded and threaded.
5. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
6. Malleable Iron Fittings: ASME B16.3, threaded fittings and ASTM A47/A47M.
7. Ductile Iron Threaded Fittings: Shall be listed for fire protection use and be manufactured to the dimensional standards of ASME B16.3.
8. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers.
9. Mechanical tee type branch and sprinkler fittings where outlets are strapped over a cut hole with a gasket O-ring are not allowed.

B Copper Tube: ASTM B75/B75M or ASTM B88 (ASTM B88M), H58 drawn temper.
1. Type: Type M (C).
2. Fittings: ASME B16.18, cast copper alloy solder joint, pressure type.
3. Joints: AWS A5.8M/A5.8 Classification BCuP-3 or BCuP-4 copper/silver braze.

C CPVC Pipe (For deduct alternate only): ASTM F442/F442M, SDR 13.5.
1. Fittings: ASTM F438 Schedule 40, or ASTM F439 Schedule 80, CPVC.
2. Joints: Solvent welded, using ASTM F493 cement.

D Ductile Iron Pipe: AWWA C151/A21.51.
1. Fittings: AWWA C110/A21.10, standard thickness.
2. Joints: AWWA C111/A21.11, SBR or vulcanized styrene-butadiene rubber gasket.

E Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped composition sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

F Flexible Sprinkler Head Connections:
1. Manufacturers
   a. Viking
   b. Easy Flex

c. Victaulic Company; Vic-Flex: www.victaulic.com.
d. Gateway Tubing
e. Flexhead Industries
f. Flex Drop
g. SprinkFLEX
h. Reliable Sprinkler
i. Or pre-approved equivalent

2. Flexible sprinkler head connections shall have materials suitable for system fluid. Connections shall be rated for 175 psi minimum working pressure.
3. Braided stainless steel flexible hose with minimum 1" outside diameter.
4. Provide 1” inlet nipple for connection to sprinkler main, outlet reducer fitting for straight outlet, EPDM seal, slip nut, preassembled with sprinkler head, zinc plated steel support bar and bracket for connection to ceiling system.

2.3 PIPE HANGERS AND SUPPORTS

A Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring or Carbon steel, adjustable steel band hanger.

B Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable steel band hanger.

C Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

D Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

E Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.

F Vertical Support: Steel riser clamp. Riser clamps shall rest on sleeves.

G Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

H Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

I Hanger rods installed in exposed, unconditioned areas such as parking garages shall be galvanized or zinc plated.

J Hanger rods installed in conditioned concealed spaces may be black.

K Hanger rods and fasteners shall be sized, spaced, and installed as recommended by the manufacturer for the service intended and per NFPA 13 and 14 requirements.

L Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners. The Subcontractor shall submit fastener details to the base building Structural Engineer for review and approval prior to submission to the Engineer. Fasteners shall meet NFPA 13 and 14 requirements and be UL listed .

1. Top Beam Clamps: Complying with ICC-ES SP-58.
2. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.

3. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
4. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
5. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
6. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
7. Other Types: As required.

2.4 MECHANICAL COUPLINGS

A Rigid Mechanical Couplings for Grooved Joints:
1. Dimensions and Testing: Comply with AWWA C606.
2. Minimum Working Pressure: 300 psig.
3. Housing Material: Fabricate of ductile iron complying with ASTM A536.
4. Housing Coating: Factory applied orange enamel.
5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
6. Bolts and Nuts: Hot-dipped-galvanized or zinc-electroplated steel.
7. Provide stops for direct stab installation without field assembly.

2.5 PRESSURE GAUGES

A Manufacturers:
1. AGF Manufacturing: www.agfmfg.com/#sle.
2. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
3. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
4. Omega Engineering, Inc: www.omega.com/#sle.
5. Winters Instruments: www.winters.com/#sle.
6. Or pre-approved equivalent.

B Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
1. Case: Steel with brass bourdon tube.
2. Diameter: 4-1/2 inch.
3. Mid-Scale Accuracy: One percent.
4. Scale: Display in psi.

2.6 DOCUMENTATION CABINET

A Provide a steel document storage cabinet located adjacent to system riser.

B The cabinet shall include paper copies of all the fire protection drawings, calculations and signs.

C The cabinet shall include electronic copies of all the fire protection drawings, calculations and signs.

PART 3 EXECUTION

3.1 PREPARATION

A Ream pipe and tube ends. Remove burrs.

B Remove scale and foreign material, from inside and outside, before assembly.

C Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

A Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B Protection of Piping Against Freezing in accordance with NFPA requirements:
1. Where portions of systems are subject to freezing and temperatures cannot reliably be maintained at or above 40°F (4°C), systems shall be installed as a dry or preaction system.

C CPVC piping and fittings shall not be installed in exposed locations unless reviewed and approved by the authority having jurisdiction and architect/engineer.

D Piping in finished portions of the building, except in mechanical equipment rooms, stairwells or where otherwise indicated on the Drawings shall be concealed.

E Route piping in orderly manner, plumb and parallel to building structure. Run all pipe straight and true. Springing or forcing piping into place will not be permitted. Install piping in such a manner as to prevent strain on the equipment..

F Install piping to conserve building space, to not interfere with use of space and other work.

G Group piping whenever practical at common elevations.

H Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

I Inserts:
1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
4. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.

J Pipe Hangers and Supports:
1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
2. Place hangers within 12 inches of each horizontal elbow.

3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
6. Where trapeze hangers are constructed, the all-thread rods supporting the trapeze member shall not extend more than 1" below the assembly.
7. Provide copper plated hangers and supports for copper piping.
8. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

K Structural Considerations:
1. Do not penetrate building structural members unless indicated.

L When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

M Die-cut threaded joints with full-cut, standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

3.3 CLEANING

A Upon completion of work, clean all parts of the installation.

B Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

3.4 FLEXIBLE SPRINKLER HEAD CONNECTIONS

A Install flexible sprinkler drops per manufacturer’s recommendations for maximum number of bends and minimum inside bend radius.

END OF SECTION

SECTION 210523

GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A Backflow Preventer.

B Bronze butterfly valves with indicators.

C Iron butterfly valves with indicators.

D Check valves.

E Bronze OS&Y gate valves.

F Iron OS&Y gate valves.

G Trim and drain valves.

1.2 ABBREVIATIONS AND ACRONYMS

A EPDM: Ethylene-propylene diene monomer.

B OS&Y: Outside screw and yoke.

C PTFE: Polytetrafluoroethylene.

1.3 REFERENCE STANDARDS

A ASME B1.20.1 - Pipe Threads, General Purpose, Inch.

B ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

C ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.

D ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators.

E AWWA C606 - Grooved and Shouldered Joints.

F FM (AG) - FM Approval Guide.

G FM 1112 - Examination Standard for Indicating Valves (Butterfly or Ball Type).

H FM 1120/1130 - Examination Standard for Fire Service Water Control Valves (OS&Y and NRS Type Gate Valves).

I FM 1140 - Examination Standard for Quick Opening Valves 1/4 Inch Through 2 Inch Nominal Size.

J FM 1210 - Examination Standard for Swing Check Valves.

K UL (DIR) - Online Certifications Directory.

L UL 258 - Shutoff Valves for Trim and Drain Purposes for Fire Protection Service.

M UL 262 - Gate Valves for Fire-Protection Service.

N UL 312 - Check Valves for Fire-Protection Service.

O NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

P NFPA 13R - Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

A See Section 013000 - Administrative Requirements for submittal procedures.

B Specification Compliance Review.

C Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

D Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

E Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.5 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.

B Installer and Maintenance Contractor Qualifications: Company specializing in performing work of type specified.
1. Trained and approved by manufacturer to design, install, test and maintain the equipment specified herein.
2. Complies with manufacturer's certification requirements.
3. Complies with manufacturer's insurance requirements.

C Where listed products are specified, provide products listed, certified, and labeled by FM (AG), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for purpose indicated.

D Welding Materials and Procedures: Comply with ASME BPVC-IX.

E All castings used for valve and specialty bodies shall be date stamped for quality assurance and traceability.

1.6 DELIVERY, STORAGE, AND HANDLING

A Prepare valves for shipping as follows:
1. Protect internal parts against rust and corrosion.
2. Protect valve ends and flange faces.
3. Set valves open to minimize exposure of functional surfaces.

B Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
   a. Provide temporary inlet and outlet caps.
   b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
   a. Store valves indoors and maintain at higher than ambient dew point temperature.
   b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.

C Use the following precautions for handling:
1. Use sling to handle large valves, rig to avoid damage to exposed parts.
2. Do not use operating handles or stems as lifting or rigging points.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Source Limitations: Furnish valves of same kind by same manufacturer.

B All equipment shall be rated for the maximum system static pressure, but in no circumstance shall equipment be installed rated for less than 175 psig.

C Valve-End Connections:
1. Flanges on Iron Valves: ASME B16.1 or ASME B16.42.
2. Threaded Ends: ASME B1.20.1.
3. Grooved Ends: AWWA C606.
4. Mechanical Pressed Ends: ASME B31.3 and ASTM F3226.

D Comply with NFPA 13, NFPA 14, and NFPA 20 for valves.

E Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.
1. 175 psig minimum pressure rating for valves in 175 psig working pressure systems.
2. 300 psig minimum pressure rating for valves in 300 psig working pressure systems.

F Valve Sizes: Same as upstream piping unless otherwise indicated.

G Valve Actuator Types:
1. Worm-gear actuator with handwheel for quarter-turn valves, except trim and drain valves.
2. Handwheel: For other than quarter-turn trim and drain valves.
3. Hand-lever: For quarter-turn trim and drain valves 2 NPS and smaller.

2.2 BACKFLOW PREVENTER ASSEMBLY

A Double Check Backflow Preventer Assemblies:
1. Manufacturers:
   a. Ames Co.
   b. Apollo Valves: www.apollovalves.com.
   c. Conbraco Industries, Inc.
   d. FEBCO; SPX Valves & Controls.
   e. Flomatic Corporation.
   f. Watts Industries, Inc.; Water Products Div.
   g. Zurn Plumbing Products Group; Wilkins Div.
   h. Or pre-approved equivalent.
2. Standard: ASSE 1015.
3. The backflow preventer assembly shall be NFS 61 certified to meet low lead requirements.
4. Operation: Continuous-pressure applications. The backflow preventer shall be a listed assembly consisting of two check valves between two gate, butterfly, or ball valves.
5. Pressure Loss: 10 psig maximum, through middle 1/3 of flow range.
6. Body: Bronze for NPS 2 and smaller; cast iron, stainless steel, or ductile iron for NPS 2-1/2 and larger.
7. End Connections: Threaded for NPS 2 and smaller; flanged or grooved for NPS 2-1/2 and larger.
8. Configuration: Designed for horizontal, straight through flow.
9. Accessories:
   a. Testing Valves: Four test cocks.

2.3 BRONZE BUTTERFLY VALVES WITH INDICATORS

A UL 1091 and FM (AG) standard listing for indicating valves, (butterfly or ball type), Class Number 1112.

B Body Material: Bronze.

C Seat: EPDM.

D Stem: Bronze or stainless steel.

E Disc: Bronze with EPDM coating or stainless steel.

F Actuator: Worm gear or traveling nut.

G End Connections: Threaded, grooved, or mechanical pressed.

2.4 IRON BUTTERFLY VALVES WITH INDICATORS

A UL 1091 and FM (AG) standard listing for indicating valves (butterfly or ball type), Class Number 112.

B Body Material: Cast or ductile iron with nylon, EPDM, epoxy, or polyamide coating.

C Seat: EPDM.

D Stem: Stainless steel.

E Disc: Ductile iron with EPDM coating or nickel plated.

F Actuator: Worm gear or traveling nut.

G Body Design: Threaded, grooved, or mechanical pressed.

2.5 CHECK VALVES

A UL 312 and FM 1210 listed.

B Body Material: Cast or ductile iron.

C Clapper: Bronze, EPDM-coated ductile iron, or stainless steel.

D Seat: Bronze or EPDM-coated bronze.

E End Connections: Flanged, Grooved, Threaded, or Mechanical Pressed.

2.6 BRONZE OS&Y GATE VALVES

A UL 262 and FM 1120/1130 listed.

B Body and Bonnet Material: Bronze or brass.

C Wedge: One-piece bronze or brass.

D Wedge Seat: Bronze.

E Stem: Bronze or brass.

F Packing: Non-asbestos PTFE.

G End Connections: Threaded.

2.7 IRON OS&Y GATE VALVES

A UL 262 and FM 1120/1130 listed.

B Body and Bonnet Material: Cast or ductile iron.

C Wedge: Cast or ductile iron, or bronze with elastomeric coating.

D Stem: Brass, bronze, or stainless steel.

E Packing: Non-asbestos PTFE.

F Supervisory Switch: External.

G End Connections: Flanged or Grooved.

2.8 TRIM AND DRAIN VALVES

A Ball Valves:
1. Description:
   a. UL 258 or FM 1140 listed.
   b. Body Design: Two piece.
   c. Body Material: Forged brass or bronze.
   d. Port Size: Full or standard.
   e. Seat: PTFE.
   f. Stem: Bronze or stainless steel.
   g. Ball: Chrome-plated brass.
   h. Actuator: Hand-lever.
   i. End Connections: Threaded, Grooved, or Mechanical Pressed.

B Angle Valves:
1. Description:
   a. UL 258 or FM 1140 listed.
   b. Body Material: Brass or bronze.
   c. Ends: Threaded, Grooved, or Mechanical Pressed.
   d. Stem: Bronze.
   e. Disc: Bronze.
   f. Packing: Asbestos free.
   g. Handwheel: Malleable iron, bronze, or aluminum.

C Globe Valves:
1. Description:
   a. UL 258 or FM 1140 listed.
   b. Body Material: Bronze with integral seat and screw-in bonnet.
   c. Ends: Threaded, Grooved, or Mechanical Pressed.
   d. Stem: Bronze.
   e. Disc Holder and Nut: Bronze.
   f. Disc Seat: Nitrile.
   g. Packing: Asbestos free.
   h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A Confirm valve interior to be free of foreign matter and corrosion.

B Remove packing materials.

C Examine guides and seats by operating valves from the fully open position to the fully closed position.

D Examine valve threads and mating pipe for form and cleanliness.

E Examine mating flange faces for conditions that might cause leakage.
1. Check bolting for proper size, length, and material.
2. Verify gasket for size, defects, damage, and suitable material composition for service.
3. Replace defective valves with new valves.

3.2 INSTALLATION

A Install valves in accessible locations to allow for operation, inspections, tests, and maintenance.

B Install listed valves in accordance with their listing.

C Install valves in accordance with manufacturer's instructions.

D Support valves independently of adjacent piping.

E Install valves in horizontal piping with stem at or above pipe center.

F Position valves to allow full actuator movement.

G Install OS&Y valves with full clearance for rising stem. Install surrounding components so they do not interfere with nor are they impacted by full extension of rising stem.

H Comply with specific valve installation requirements and application in the following Sections:
1. Section 21 1200 for application of valves in fire-suppression standpipes.
2. Section 21 1300 for application of valves in wet, dry, and preaction fire-suppression sprinkler systems.

I Install supervised shutoff valves in supervised-open position.
1. Install permanent identification signs indicating portion of system controlled by each shutoff valve.
2. Install threaded-end valves with unions upstream and downstream.

J The backflow preventer assembly installation shall meet the following guidlines:
1. Located as close as possible/practical to the potable water supply point of connection. In no case shall it be located more than 25 feet from the point of connection.
2. Installed in the orientation intended by the manufacturer.

3. Minimum 12" clearance from each side.
4. Minimum 12" clearance from the bottom of the assembly to the floor.
5. Installed so that the make and serial number are visible in a readily accessible location.

K Check valves shall be installed in horizontal piping or vertical piping with the discharge direction being up.

L Install valve tags. See Section 210553. Label valves in accordance with NFPA standard applying to the piping system in which valves are installed.

M Mechanical Pressed Fittings:
1. When mechanical pressed fitting connections are used in a system, all hydrostatic tests shall be performed per NFPA and AHJ requirements, except the testing period shall be not less than eight (8) hours.
2. The joints shall be pressed using the tool(s) approved by the manufacturer.
3. All welds in the system are to be completed before any press connections are made.
4. Threaded connections need to be tightened prior to pressing in line fittings.

END OF SECTION

SECTION 210553

IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A Nameplates.

B Tags.

C Pipe markers.

1.2 REFERENCE STANDARDS

A ASME A13.1 - Scheme for the Identification of Piping Systems.

B ASTM D709 - Standard Specification for Laminated Thermosetting Materials.

1.3 SUBMITTALS

A Specification Compliance Review.

B List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

D Product Data: Provide manufacturers catalog literature for each product required.

E Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.

F Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A Advanced Graphic Engraving, LLC: www.advancedgraphicengraving.com.

B Brady Corporation: www.bradycorp.com.

C Brimar Industries, Inc: www.pipemarker.com.

D Champion America, Inc: www.Champion-America.com.

E Kolbi Pipe Marker Company: www.kolbipipemarkers.com.

F Marking Services, Inc.: www.markserv.com

G MIFAB, Inc: www.mifab.com.

H Seton Identification Products: www.seton.com/aec.

I Or pre-approved equivalent

2.2 NAMEPLATES

A Description: Laminated three-layer plastic with engraved letters.
1. Letter Color: White.
2. Letter Height: 1/2 inch.
3. Background Color: Red.
4. Thickness: 1/8 inch.
5. Plastic: Comply with ASTM D709.

2.3 TAGS

A Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

B Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

C Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.4 PIPE MARKERS

A Color: Comply with ASME A13.1.

B Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of the fluid or s being conveyed.

C Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D Underground Plastic Pipe Markers: Bright-colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

PART 3 EXECUTION

3.1 PREPARATION

A Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B Install tags with corrosion resistant chain.

C Install plastic pipe markers in accordance with manufacturer's instructions.

D Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F Apply ASME A13.1 Pipe Marking Rules:
1. Identify service and flow direction if applicable.
2. Provide additional identification if the sysetm is medium or high pressure when multiple pressure zones are being provided for the same system in the building.
3. Place pipe marker every 20 feet on straight runs including risers and drops.

G Use tags on piping 3/4 inch diameter and smaller.
1. Identify service, flow direction, and pressure.
2. Install in clear view and align with axis of piping.
3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

3.3 TAGS

A Install tags with corrosion-resistant chain.

B Identify valves in main and branch piping with tags.

3.4 PIPE MARKERS

A Install plastic pipe markers in accordance with manufacturer's instructions.

B Install plastic tape pipe markers complete/around pipe in accordance with manufacturer's instructions.

C Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction.

D All underground piping systems shall have a non-metallic warning tape, with appropriate warning, buried 24 inches above top of pipe.

3.5 NAME PLATES

A Install plastic name plates with stainless steel screws.

B Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates.

C Identify control panels and major control components outside panels with plastic nameplates.

3.6 VALVE AND EQUIPMENT SCHEDULE BINDER

A Provide 3-ring binder for all valve and equipment schedules with tabs and plastic page protectors for each system. Schedules to be on standard - size bond paper with following information:
1. Valve Schedules:
   a. Valve number
   b. Piping system
   c. System abbreviation (as shown on valve tag)
   d. Normal operating position (opened, closed, modulating)
   e. Indicate emergency shutoff or similar special uses.
2. Equipment Schedules:
   a. Owners equipment label
   b. Location
   c. All data from manufacturer's equipment label including Model No., Serial No., Electrical data, etc.
   d. Pump water flow and pressure
   e. Motor data and measured amps at balancing
3. As-Built Record Building Plans:
   a. Indicate all valve and equipment locations
   b. Provide in electronic format, .pdf or .dwg

3.7 ADJUSTING

A Relocate identification materials and devices that have become visually blocked by other work.

END OF SECTION

SECTION 211300

FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A Wet-pipe sprinkler system.

B System design, installation, and certification.

C Fire department connections.

1.2 REFERENCE STANDARDS

A FM (AG) - FM Approval Guide.

B ITS (DIR) - Directory of Listed Products.

C NFPA 1963 - Standard for Fire Hose Connections.

D UL (DIR) - Online Certifications Directory.

E UL 405 - Standard for Safety Fire Department Connection Devices.

1.3 SUBMITTALS

A Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

B Shop drawings and hydraulic calculations shall be submitted under Specification Section 210400 and follow the requirements documented there.

C Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

D Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
2. Sprinkler Wrenches: For each sprinkler type.

E Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1. Sprinklers shall be referred on the drawings with the sprinkler identification number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

1.4 QUALITY ASSURANCE

A Maintain one copy of referenced design and installation standard on site.

B Comply with UL (DIR) requirements.

C Designer Qualifications: Individual person employed full-time by the water-based fire protection system contractor who meets the following requirements:
1. Designs the system under direct supervision of a Professional Fire Protection Engineer experienced in design of this type of work and is licensed in the State in which the Project is located.
2. Is currently certified by the National Institute for Certification in Engineering Technologies (NICET) at a Level III or Level IV in fire protection engineering technology, automatic sprinkler layout, or another nationally recognized certification in an automatic sprinkler system layout recognized by the State Fire Marshal.

D Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum

E Installer Qualifications: Company specializing in performing the work of this section.

F Equipment and Components: Provide products that bear FM (AG) label or marking.

G Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified and indicated.

H Each individual Fire Protection component (including fire sprinklers, valves and accessories) shall be supplied by one manufacturer and shall be UL listed .

I All castings used for valve and specialty bodies shall be date stamped for quality assurance and traceability.

1.5 DELIVERY, STORAGE, AND HANDLING

A Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A Sprinklers, Valves, and Equipment:
1. Reliable Automatic Sprinkler Co., Inc.: www.reliablesprinkler.com
2. Tyco Fire Protection Products, a Tyco Business: www.tyco-fire.com.
3. Victaulic Company: www.victaulicfire.com/

4. Viking Corporation: www.vikinggroupinc.com.
5. Or pre-approved equivalent.

2.2 SPRINKLER SYSTEM

A Sprinkler System: Provide coverage for entire building.

B Occupancy: Comply with the NFPA 13 Hazard Classifications of Occupancies and Commodities, unless noted otherwise.

C Water Supply: Determine volume and pressure from current water flow test data.
1. Revise design when test data available prior to submittals.

D Safety Factor: The hydraulic calculations shall show the automatic water supply can meet the required system flow and pressure demand.

E Interface system with building fire and smoke alarm system.

F Provide fire department connections where indicated.

G Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to system riserin fire entrance room.
1. Provide the number of spare sprinklers required by NFPA for each sprinkler type used on the project.
2. Provide one sprinkler wrench as specified by the sprinkler manufacturer for each sprinkler type used on the project.
3. A list of the sprinklers installed in the property
   a. Sprinkler Identification Numbers (SIN).
   b. General descriptions.
   c. Quantity of each type to be contained in the cabinet.
   d. Quantity of each type installed on the project.
   e. Revision date of the list.
4. Provide additional cabinets as needed to cleanly store all spare sprinklers and tools.

2.3 SPRINKLERS

A Sprinkler type and finish for typical locations are defined below. Supplemental information is also provided in the MEP and architectural drawings.

B Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Enamel, color white .
4. Escutcheon Plate Finish: Enamel, color white.
5. Fusible Link: Glass bulb or fusible solder link type temperature rated for specific area hazard.

C Exposed Area Type: Upright type.
1. Response Type: Quick.

2. Coverage Type: Standard.
3. Finish: Brass.
4. Fusible Link: Glass bulb or fusible solder link type temperature rated for specific area hazard.

D Sidewall Type: Recessed horizontal sidewall type with matching push on escutcheon plate.
1. Response Type: Quick.
2. Coverage Type: Standard.
3. Finish: Enamel, color white .
4. Escutcheon Plate Finish: Enamel, color white .
5. Fusible Link: Glass bulb or fusible solder link type temperature rated for specific area hazard.

E Escutcheons and guards shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.
1. Guards: Chrome finish.

F Wrenches shall be provided by the sprinkler manufacturer that directly engage the wrench boss cast in the sprinkler body.

2.4 PIPING SPECIALTIES

A Wet Pipe Sprinkler System Riser Manifold shall consist of:
1. Vane type water flow switch.
2. Valve assembly capable of main drain and inspector test functions.
3. Pressure gauge.
4. Pressure relief valve.
5. Site glass.
6. Individual components may be provided separetly instead of in a manufactured manifold package.
7. The wet pipe sprinkler system riser manifold shall also be provided with:
   a. Isolation butterfly, gate, or ball valve with supervisory tamper switch.
   b. Check valve.

B Air Release Valve:
1. Automatic Air Release Valve
   a. Furnish and install an air vent that is UL listed for use on wet fire sprinkler systems. The vent shall automatically release trapped air from the piping during system fill or as air migrates to the vent location over time. The vent shall automatically close when water reaches the device, and a retention pan or piped discharge to a drain shall be provided to capture and contain any incidental water.
   b. The air vent shall have a minimum ½” NPT male connection to the sprinkler system and be furnished connected to a “y” type strainer. Furnish and install a ball valve to isolate the air vent from system pressure for replacement or strainer maintenance.
   c. All components and fittings shall be brass.
   d. The air vent valve shall be located at the high point on each fire sprinkler system as selected by the fire sprinkler designer to assure evacuation of trapped air in the piping.
   e. The air vent shall be mounted in a vertical position with the manufacturer required clearance above the fire sprinkler main or branch line piping.

f. The air vent shall be located over areas without a ceiling, above a lay-in ceiling, or above an access panel.

C Test Connections:
1. Inspector's Test Connection for Wet Systems:
   a. Provide a test and drain valve at the system riser after the flow switch. The test orifice shall match the size of the smallest sprinkler orifice used in the system.
   b. Route test connection to discharge outside the building.

D Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

E Fire Department Connections:
1. Type: Flush, wall mount made of corrosion resistant metal complying with UL 405.
   a. Body: Cast Brass with clappers.
   b. Inlets: Two way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
   c. Configuration: Horizontal.
   d. Outlet: With pipe threads, 4 NPS.
   e. Minimum Pressure Rating: 175 psig.
   f. Finish: Chrome.
   g. Signage: Raised or engraved lettering 1 inch minimum indicating system type.
   h. Manufacturers:
      1) Elkhart Brass Manufacturing Company, Inc: www.elkhartbrass.com.
      2) Fire End & Croker Corporation: www.croker.com.
      3) Guardian Fire Equipment, Inc: www.guardianfire.com.
      4) Potter Roemer Fire Pro: www.potterroemer.com
      5) Or pre-approved equivalent.

F Indicator-Post Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.
1. Manufacturers:
   a. Potter Electric Signal Company.
   b. System Sensor.

G Pressure Switch: UL 753, electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
1. Manufacturers:
   a. Grinnell Fire Protection.
   b. Potter Electric Signal Company.
   c. System Sensor.
   d. Viking Corp.

H Valve Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.

1. Manufacturers:
   a. McWane, Inc.; Kennedy Valve Div.
   b. Potter Electric Signal Company.
   c. System Sensor.

PART 3 EXECUTION

3.1 INSTALLATION

A Install in accordance with referenced NFPA design and installation standard.

B Install equipment in accordance with manufacturer's instructions.

C Provide approved backflow preventer assembly at sprinkler system water source connection.

D Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent fire department or pump test connectors to allow full swing of fire department wrench handle.

E Locate outside horn and strobe on building wall as indicated.

F Install pipe runs to minimize obstruction to other work.

G Install piping in concealed spaces above finished ceilings.

H Install any dry lengths of drain piping sloped at a minimum 1/4" per 10’-0” of run from the drain valve to the point of discharge. Provide an auxiliary drain at any trapped low points on the drain piping.

I Center sprinklers in two directions in ceiling tile and provide piping offsets as required, no closer than 6 inches from ceiling grid members.

J Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

K Flush entire piping system of foreign matter.

L Install guards on sprinklers where subject to damage.

M Do not install sprinklers that have been dropped, damaged, show a visible loss of fluid, or a cracked bulb.

N The sprinkler bulb protector shall be removable by hand, without tools or devices that may damage the bulb.

O Hydrostatically test entire system.

P Require test be witnessed by Fire Marshal.

Q Fire Alarm Contractor shall connect all sprinkler devices to fire alarm control panel. All devices shall have a unique address.

R Fire sprinklers protecting unfinished shell spaces shall not be installed directly on the branch line serving the area. They shall be installed on 1" x 0'-4" arm overs, 1" x 1/2" bushings, or 1" sprigs to provide a 1" threaded outlet for future system adjustment.

3.2 SPECIAL SITUATIONS

A The following requirements reflect some of the special fire protection requirements included in this project, but may not represent all atypical arrangements that may be encountered. All NFPA and local jurisdictional requirements must be followed.

B All electrical rooms shall be provided with fire sprinkler protection unless specifically prohibited by building code.

C All Hydraulic Passenger Elevators
1. No fire sprinklers or water filled piping shall be allowed at the top of the hoistway.
2. Fire sprinklers shall be installed in the elevator pit.
3. Fire sprinklers shall be installed in the machinery spaces.

D All Occupant Evacuation Elevators
1. No fire sprinklers or water filled piping shall be allowed at the top of the hoistway.
2. No fire sprinklers or water filled piping shall be allowed in the elevator pit.
3. No fire sprinklers or water filled piping shall be allowed in the machinery spaces, control rooms, or control spaces.

3.3 FIELD QUALITY CONTROL

A Initial Inspections and Tests: All inspections, examinations and tests required by NFPA 13 and the authorities and/or agencies specified hereinbefore shall be arranged and paid for by the Subcontractor, as necessary to obtain complete and final acceptance of the system as installed. A means to perform these tests without hindering the system operation or creating a nuisance to the owner shall be provided, including any additional valves and piping necessary to do so. The certificates of inspection shall be furnished as Submittal Data.

B Periodic Inspection Service: After completion of the fire sprinkler systems and at the beginning of the warranty period the Subcontractor shall perform, without charge to the Owner, one inspection of the systems. Inspection shall be as per the applicable NFPA 25 sections, plus the following maintenance to be performed during the course of the inspection:
1. Operation of all control valves.
2. Lubrication of operating stems of all interior valves.
3. Operation of electric alarms, supervisory panels, air compressors, alarm trip switches, flow switches, etc.
4. Lubrication of Fire Department hose connection inlet and fire hose valve threads.

C Acceptance tests shall be witnessed by the Fire Marshal.

3.4 INTERFACE WITH OTHER PRODUCTS

A Ensure required devices are installed and connected as required to fire alarm system.

3.5 PROTECTION AGAINST FREEZING

A Where any area of a building is subject to freezing and the temperatures cannot be reliably maintained at or above 40°F, the area shall be protected by a dry barrel fire sprinkler served from a wet fire sprinkler system.

B Building areas that may be subject to freezing include, but are not limited to:
1. Entry vestibules.

3.6 SCHEDULES

A Occupancy hazard clasifications based on NFPA guidlines, with area and sprinkler spacing and water density delivery based on NFPA 13 standards, unless modified below.
1. Light Hazard: LH
2. Ordinary Hazard, Group 1: OH1

B System Hazard Areas:
1. Offices: LH
2. Computer Room: LH
3. Storage Closets/Rooms: OH1
4. Mechanical/Electrical Rooms: OH1
5. Restrooms/Locker Rooms: LH

END OF SECTION

SECTION 220400

COMMON REQUIREMENTS FOR PLUMBING

PART 1 GENERAL

1.1 SUMMARY

A This section describes the general requirements of these specifications and shall apply to all phases of the work indicated or required to provide for complete installation of all systems for this project.

B This Section includes basic materials and methods to complement other Division 22 Sections.

1.2 WARRANTIES

A Warrant all materials, workmanship and equipment against defects for a period of one year after the date of substantial completion.

B Certain equipment shall be warranted beginning at the time of final acceptance or for longer periods of time as specified in those divisions of the Project Manual.

C Repair or replace, at no additional cost to the Owner, any item which may become defective within the warrant period.

D Any manufacturers' warranties concerning any item installed will run to the benefit of the Owner.

E The Contractor agrees not to void or impair, or to allow Sub-Contractors to void or impair, any warranties regarding products or items installed as part of this project.

F The repair of faulty workmanship shall be considered to be included in the contract.

1.3 QUESTIONS OF INTERPRETATION DURING BIDDING PHASE

A If questions arise during the bidding process regarding the meaning of any portion of the contract documents, the prospective bidder shall submit the questions to the Architect for clarification.

B Any definitive interpretation or clarification of the contract documents will be published by addenda, properly issued to each person holding documents, prior to the bid date.

C Verbal interpretation or explanation not issued in the form of an addendum shall not be considered part of the bidding documents.

D When submitting questions for clarification, adequate time for issuance and delivery of addenda must be allowed.

E The Architect shall be the sole judge regarding interpretations of conflicts within contract documents.

1.4 CONTRACT DOCUMENT DISCREPANCIES

A If any ambiguities should appear in the contract documents, request clarification from the Architect before proceeding with the work.

B If the Contractor fails to make such request, no excuse will thereafter be entertained for failure to carry out the work in a manner satisfactory to the Architect.

C Should a conflict occur within the contract documents, the Contractor is deemed to have estimated the more expensive way of doing the work unless a written clarification from the Architect was requested and obtained before submission of proposed methods or materials.

D The Architect shall be the sole judge regarding interpretations of conflicts within contract documents.

1.5 DEFINITIONS

A The following definitions shall apply throughout the contract documents:

1. Architect: Architect or Engineer
2. Code: All applicable national, state and local code
3. Mechanical: All plumbing, HVAC, & fire protection work required by the Contract Documents
4. Electrical: All electrical and fire alarm work required by the Contract Documents
5. Contractor: Any Contractor performing work required by the Contract Documents
6. Indicated: Shown on drawings, noted, scheduled or specified
7. Selected: Selected by the Architect or Engineer
8. Provide: Furnish, install, connect and tested complete and ready for use
9. Furnish: Supply and deliver to the site ready for installation
10. Install: Install complete, per Contract Documents and manufacturer's requirements.
11. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
12. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
13. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations and in parking garages.
14. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
15. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
16. Dry Locations: A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.
17. Damp Locations: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.
    a. Examples of such locations include partially protected locations under canopies, marquees, roofed open porches, and like locations, and interior locations subject to

moderate degrees of moisture, such as some basements, some barns, and some cold storage warehouses.

18. Wet Locations: Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

1.6 SYMBOLS

A Items of equipment and materials are indicated on the drawings in accordance with the symbols shown on the plans.

1.7 ABBREVIATIONS

A Refer to abbreviations list shown on the Drawings.

1.8 CODES

A The work shall be performed by persons skilled in the trade involved and shall be done in a manner consistent with normal industry standards.

B All work shall conform to all applicable sections of currently adopted editions of the following codes, standards, and specifications:

1. International Building Code (IBC)
2. International Energy Conservation Code (IECC)
3. International Fuel Gas Code (IFGC)
4. Uniform Plumbing Code(UPC)
5. International Mechanical Code (IMC)
6. Safety and Health Regulations for Construction
7. Occupational Safety and Health Standards (OSHA), National Consensus Standards and Established Federal Standards
8. National Electrical Code (NEC)
9. National Fire Protection Association (NFPA)
10. Life Safety Code (NFPA 101)
11. American Gas Association (AGA)
12. Underwriters' Laboratories, Inc. (UL)
13. National Electrical Safety Code (NESC)
14. All applicable national, state and local codes and amendments.

1.9 PERMITS

A The Contractors shall familiarize themselves with all requirements regarding all permits, fees, etc., and shall comply with them.

B All permits, licenses, inspections and arrangements required for the work shall be obtained by the Contractor at his expense.

C All utilities shall be installed in accordance with the local rules and regulations and all charges shall be paid by the Contractor.

1.10 CODE COMPLIANCE

A Work shall be in accordance with all applicable codes. Where the codes and drawings do not agree, the code shall take precedence; however, code shall take precedence over what is shown only when it is more stringent than that indicated. Items that are allowed by codes which are less stringent than that shown on the drawings shall not be substituted.

B Drawings, plans, and schematics and diagrams indicate the general location and the arrangement of systems. Wherever practical, install systems as indicated.

C Where the National Electrical Code or applicable codes require controllers to be marked with a Short Circuit Current Rating (SCCR), the equipment shall be manufactured as required such that the SCCR of the equipment meets or exceeds the available short circuit current at the equipment.

1.11 MATERIALS AND EQUIPMENT MANUFACTURERS

A Options in selecting materials and equipment are limited by requirements of the contract documents and governing regulations. They are not controlled by industry traditions or procedures experienced on previous construction projects.

B Materials and equipment shall be provided in accordance with the following:
1. Primary Design Products: Primary design products are those products around which the project was designed in terms of capacity, performance, physical size and quality.
2. Primary design products are indicated by use of a single manufacturer's name, model number or similar data on drawings or schedules or within the specifications.
3. Provide primary design products unless substitutions are made in accordance with the following paragraphs.
4. Acceptable Equivalent Substitutions: Acceptable equivalent substitutions are products of manufactures other than those listed for the primary design products. Equivalent acceptable substitutions shall meet each of the following requirements:
    a. The product shall be manufactured by one of the acceptable manufacturers listed in the Project Manual, drawings, or addenda.
    b. The product shall meet or exceed the requirements of the contract documents in terms of quality, performance, suitability, appearance, and physical characteristics.
    c. The Contractor providing the substitution shall bear the total cost of all changes due to substitutions. These costs may include additional compensation to the Architect for redesign and evaluation services, increased cost of work by the Owner or other Contractors, and similar considerations.
5. Performance Requirements: Where the contract documents list performance requirements or describe a product or assembly generically, provide products that comply with the specific requirements indicated and that are recommended by the manufacturer for the respective application.
6. Compliance with Standards, Codes and Regulations: Where the specifications require only compliance with an imposed standard, code or regulation, the Contractor has the option of selecting a product that complies with specification requirements, including the standards, codes and regulations.

C Proposed substitutions will be judged on the basis of quality, performance, appearance and on the governing space limitations. The reputation of the manufacturer, delivery time requirements, and the availability of repair or replacement parts may also be considered.

D The Architect shall be the sole and final judge as to the suitability of substitution items.

1.12 SUBMITTALS

A Shop Drawings, Product Data and Samples:
1. Other section in the Project Manual shall be adhered to if more stringent than the following paragraphs.
2. When required by other sections of this Project Manual, submit shop drawings, product data or samples to the Architect for review.
3. Submittals deemed unnecessary by the Architect shall be returned indicating “No Action Taken”.
4. A completed copy of the transmittal form included with the Project Manual shall accompany each submittal.
5. The shop drawing submittals shall be numbered consecutively under Specification Section 220400. The submittal subject shall clearly summarize the area or system being issued for review.
6. The product data submittal ID shall be numbered consecutively under the applicable Project Manual section, ending with the revision number. The submittal subject shall be the product data description.
   a. For example, the first revision of the second submittal for product data specified in Section 220523 shall have an ID of ‘220523-002-1’.
7. Submittals not listed in the Project manual shall reference the respective contract document.
8. Unless otherwise noted, submit one copy electronically of shop drawings and product data for review. Review comments will be returned electronically. A hard copy of the electronic submittal will be returned if requested.
   a. Shop drawings and product data shall be in original searchable PDF format.
9. Shop drawings are drawings, diagrams, schedules and other data specifically prepared for this project by the Contractor, Manufacturer, Supplier, or Distributor to illustrate some portion of the work. Shop Drawings shall also detail fabrication and installation for metal and wood supports and anchorage for plumbing materials and equipment.
   a. Shop drawings shall be drawn to accurate scale and of adequate size to illustrate required details.
10. Product data are illustrations, standard schedules, performance charts, instruction brochures, diagrams and other information furnished by the Contractor, Manufacturer, Supplier, or Distributor to illustrate a material, product or system for some portion of the work.
11. All submittals shall clearly indicate proposed items, capacities, characteristics and details in conformance with contract documents. All equipment items shall be marked with the same item number as used on drawings or schedules. Capacities, dimensions and special features required shall be certified by the manufacturer.
12. The Architect shall review or take other appropriate action upon the Contractor's submittals such as shop drawings, product data and samples, but only to determine conformance with the design concept of the work and the information given in the contract documents.

13. Contractor shall not be relieved of responsibility for any deviation from the requirements of the contract documents by the Architect's review of shop drawings, product data or samples.
14. Contractor shall not be relieved from responsibility for errors or omissions in the shop drawings, product data or samples by the Architect's review of those drawings.

B Coordination Drawings: Detail major elements, components, and systems of plumbing equipment and materials in relationship with other systems, installations, and building components. Show space requirements for installation and access. Indicate if sequence and coordination of installations are important to efficient flow of the Work.

1. Include the following:
   a. Planned piping layout, including valve and specialty locations and valve-stem movement.
   b. Clearances for installing and maintaining insulation.
   c. Clearances for servicing and maintaining equipment, accessories, and specialties, including space for disassembly required for periodic maintenance.
   d. Equipment and accessory service connections and support details.
   e. Exterior wall and foundation penetrations.
   f. Fire-rated wall and floor penetrations.
   g. Sizes and location of required concrete pads and bases.
   h. Scheduling, sequencing, movement, and positioning of large equipment into building during construction.
   i. Floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
   j. Reflected ceiling plans to coordinate and integrate installation of air outlets and inlets, light fixtures, communication system components, sprinklers, access doors or panels and other hanging or ceiling-mounted items.
   k. All Contractors are required to provide information concerning their part of the work needed to develop the coordination drawings.
   l. Coordination Drawing Content:
      1) Drawings shall contain all of the following that are applicable:
         (a) Ductwork, equipment, and terminal devices (showing access and service requirements). Ductwork, equipment and terminal devices indicated in the coordination drawing content must be the same as that indicated in all submittals.
         (b) Plumbing
         (c) HVAC piping
         (d) Recessed, surface mount, and exposed hanging light fixtures
         (e) Electrical conduit 2 inches and larger
         (f) Cable tray
         (g) Fire sprinkler piping
         (h) Structure and general construction
         (i) Access doors and panels
         (j) Other areas indicated by the Contractor that involve congestion
      2) Complete drawings after submitting product data on items included in coordination drawings.

C Operation and Maintenance Manuals:

1. Prepare electronic operation and maintenance manuals for the equipment furnished.
2. The manual shall be in original searchable PDF format with equipment organized by specification section. Bookmarking shall be provided in the PDF for each specification section and piece of equipment.
3. Manuals shall be submitted to the Architect for review and distribution to the Owner not less than 30 days prior to substantial completion of the project.
4. Manuals not meeting the requirements of this section may be rejected by the Architect.
5. Manual shall include, but shall not be limited to, the following:
    a. A cover page including:
        1) Project name and address
        2) Division of work covered by the manual
        3) Name, address and telephone number of Contractor and all Sub-Contractors including night or emergency numbers
    b. A Complete Index. Contractor may submit the index to the Architect for review prior to submittal of complete manuals if desired.
    c. Manufacturer's equipment product data O&M manuals and parts lists identified by the equipment mark used in the contract drawings.
    d. Names, Addresses and Telephone Numbers. This list shall include the manufacturer and local representative who stocks or furnishes repair parts for all items of equipment and shall be typed on a single page in front of the manual.
    e. Startup, Operation and Shutdown Procedures. Provide a written description of procedures for startup, operation and shutdown of each item or system. This description shall include motors to start, valves to open, etc., in proper sequence, and the location of switches, starters, pushbuttons and valves. Description shall include item references or labels used in the contract documents unless otherwise instructed in advance by the Owner.
    f. Seasonal Changeover Procedure. Provide a written description of the procedure for necessary seasonable changeover from heating to cooling and vice versa.
    g. Equipment Accessory Schedule. Upon completion of the work, furnish the Owner with a complete equipment accessory schedule listing each piece of equipment and the related size, type, number required and the manufacturer of all renewable items.
    h. Lubrication Schedule. Provide a chart listing each piece of equipment, the proper type of oil or grease required, and recommended frequency of lubrication.
    i. Emergency Procedures. Provide a written description of emergency operating procedures or a list of service organizations (including addresses and telephone numbers) capable of rendering emergency services to the various parts of the system.
    j. One copy of all shop drawings.
    k. Signed letters of certification of inspection and similar information.
    l. All manufacturers' warranty information.
    m. Provide documentation that training was performed for each item specified to include Owner training. Include name of Owner’s representative(s) present, date and time of training.
    n. Normal Maintenance Schedule. Include a listing of work to be performed at various time intervals; i.e., 30, 90, 180 days and yearly.
    o. Provide documentation that Extra Materials were received by the Owner for each section requiring Extra Materials.

p. Motor List. The list shall indicate motor location, equipment served (using labels indicated on drawings), horsepower, electrical characteristics, motor type, and rpm. Motors less than 1/2 horsepower need not be included.

1.13 OPERATING TRAINING

A Complete operating instructions for each system and item of equipment shall be provided to the Owner's designated personnel.

B Operation and Maintenance Manuals must be reviewed and accepted by the Architect and provided to the Owner prior to operating training.

C Training shall be scheduled at the convenience of the Owner. A minimum of 2 hours, per system, of training shall be provided.

D Training shall include instructions on the following:
1. Startup and shutdown procedures
2. Seasonal changeover
3. Periodic maintenance
4. Emergency operation
5. Safety

E In addition to the instructions required above, wherever possible perform the operations being described in order to fully illustrate system operation.

F At the completion of training, turn over to the Owner all required keys and special tools for installed equipment. Each key or tool shall be labeled with its use.

1.14 QUALITY ASSURANCE

A Steel Support Welding: Qualify processes and operators according to AWS D1.1, “Structural Welding Code-Steel”.

B Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, “Welding and Brazing Qualifications”.
1. Comply with provisions in ASME B31 Series, “Code for Pressure Piping”.
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C Electrical Characteristics for Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.15 DELIVERY, STORAGE, AND HANDLING

A Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.16 COORDINATION

A Drawings, plans, and schematics and diagrams indicate the general location and the arrangement of systems. Wherever practical, install systems as indicated.

B Provide offsets and elevation changes in piping as required to complete the Layout and Coordination Process. Offsets and elevation change information shall be indicated in the coordination process documentation and must be submitted for review.

C Arrange for spaces, chases, slots, and openings in building structure during progress of construction to allow for system installations.

D Coordinate arrangement, mounting, and support of equipment.
1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.

E Coordinate routing of all piping in open and exposed areas with light fixture locations. Where piping will be installed at or below the mounting height of lights, piping shall not pass directly below or within a proximity that will create an obstruction to the required light pattern. Deviations and/or conflicts discovered in the field shall be resolved, to owner/architect/engineer satisfaction, at no additional cost to the project.

F Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the installations that follow.
1. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.

G Sequence, coordinate, and integrate installing materials and equipment for efficient flow of the Work. Coordinate installing large equipment requiring positioning before closing in the building.

H Coordinate service connections to components furnished by utility companies.
1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for metering components.
2. Comply with requirements of authorities having jurisdiction and of utility company providing water, gas, electrical power and other services.

I Coordinate location of access panels and doors for items that are concealed by finished surfaces.

J Coordinate testing of items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

1.17 STRUCTURAL COORDINATION

A In cases where the Contractor determines that superimposed loads such as suspended or floor mounted mechanical, electrical, plumbing system or equipment exist which exceed design loads indicated on structural contract documents, Contractor shall submit load data to Design Professionals for review prior to proceeding with work.

B Distribute the maximum load hung from any structural member for mechanical, electrical, plumbing, piping, etc. over the member's tributary area in a way that the design superimposed dead loads listed in structural contract documents are not exceeded. The Contractor shall coordinate the loads and provide additional support or distribution framing as required achieving the allowable load distribution.

C Connections of systems designed by Contractor's engineer such as, but not limited to mechanical, electrical, plumbing loads are assumed to impose vertical and/or horizontal loads on the base building structural members without generating torsion in the supporting structural members. Contractor is responsible for furnishing and installing all supplementary bracing members as required to prevent torsion on the base building structure.

D Coordinate locations of new fire suppression, plumbing and HVAC penetrations through existing structure and construction. Utilize all existing documentation of conditions for coordination. Verify penetrations utilizing GPR (Ground Penetrating Radar) as necessary to confirm penetration locations.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Specific Notes and/or Equipment Schedules with Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 EQUIPMENT SHORT CIRCUIT CURRENT RATING

A Where the National Electrical Code or applicable codes require equipment to be marked with a Short Circuit Current Rating (SCCR), the equipment shall be manufactured as required such that the SCCR of the equipment meets or exceeds the available short circuit current at the equipment. Acceptable methods of complying with this requirement are as follows:

1. Provide SCCR rating at the equipment that meets or exceeds the available short circuit current at the switchboard or panelboard where the equipment circuit originates.
2. Provide calculations, based on the available short circuit current at the switchboard or panelboard where the equipment circuit originates, that document the actual short circuit current available at the equipment. The SCCR rating of the equipment shall meet or exceed this calculated value.

2.3 MATERIALS

A Unless otherwise specified, all materials and equipment shall be new, unused and undamaged. Materials and equipment shall be the current and standard designs of manufacturers regularly engaged in their production.

2.4 MATERIALS AND EQUIPMENT FURNISHED BY OTHERS

A Where materials and equipment are indicated as furnished by others and installed or connected under this contract, it shall be the Contractor's responsibility to verify installation details and requirements.

2.5 QUANTITY OF SPECIFIED ITEMS REQUIRED

A Wherever in these specifications an article, device or piece of equipment is referred to in the singular number; such reference shall apply to as many such articles as are shown on the drawings or required to complete the installation.

2.6 CONCRETE

A Refer to the structural engineering drawings for pad concrete strength, typically 3500-psi minimum, 28-day compressive strength.

B Equipment pads:
1. Forms: Shall be a minimum 3-1/2" height (unless noted otherwise), 3/4" chamfered edge at top of form.
2. Reinforcement: 6 x 6 x 10/10 welded wire fabric.

2.7 SEALANTS AND FIRESTOPPING

A Manufacturers:
1. Sealants:
   a. Dow Corning
   b. Pecora
   c. Sonneborn
   d. Tremco
   e. Or pre-approved equivalent.
2. Firestopping Materials and Systems:
   a. A/D Fire Protection Systems Inc: www.adfire.com.
   b. 3M Fire Protection Products: www.3m.com/firestop.
   c. Hilti, Inc: www.us.hilti.com.
   d. Nelson FireStop Products: www.nelsonfirestop.com.
   e. Specified Technologies, Inc: www.stifirestop.com.
   f. Tremstop Fyre-Sil Sealant - Tremco Sealants & Coatings
   g. Or pre-approved equivalent.

B Silicone Sealant: Single component, air curing, non-staining, non-bleeding, capable of continuous water immersion, non-sagging type for application in vertical joints and in horizontal joints, color as selected.

C Primer: Non-staining type, recommended by sealant manufacturer to suit application.

D Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

E Joint Backing: ANSI/ASTM D1056; round, closed cell, polyethylene foam rod; oversized 30% to 50% larger than joint width.

F Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

G Firestopping Materials and Systems:
1. UL Listed products and assemblies.
2. Subject to compliance with the requirements of Division 07 Fire and Smoke Protection.

2.8 ACCESS DOORS

A Manufacturers:
1. Access Doors:
   a. J. L. Industries
   b. Karp Associates, Inc.
   c. Larsons Mfg. Co.
   d. Milcor, Inc.
   e. Miller Limited Partnership
   f. Nystrom, Inc.
   g. Or pre-approved equivalent.

B Prime coated 14 gauge steel, flush, with screwdriver operated cam lock, frame to accommodate construction type; size as indicated.

2.9 ELECTRICAL WIRE

A All wiring materials covered by this section shall be in accordance with the latest revision of the National Electrical Code and applicable local codes and shall carry the UL label where applicable.

B All wiring running exposed in return air plenums shall be plenum-rated cable for fire and smoke spread.

2.10 LOW VOLTAGE CONTROL WIRE AND CABLE

A Analog Input, Analog Output, Binary Input, Binary Output, 24 VAC, and General Purpose Cabling:
1. Cable shall consist of copper conductors not less than #18 AWG stranded.
2. Cable shall be two- or three-conductor twisted cable with a drain wire.
3. Cable shall have a 100 percent overall shield.
4. Cable shall be plenum rated.

5. Cable shall meet or exceed NEC voltage rating of 300 volts.
6. Cable shall be NEC type CMP.
7. Cable shall meet or exceed UL temperature rating of +60 deg C.

2.11 BACKFILL MATERIAL AND MIXES

A Earth Fill: Approved type of soil classified, in accordance with ASTM D2487, as GW, GP, GM, GC, SW, SP, SM. SC, ML or CL, and free of foreign substances, obtained from excavation on this project or other approved source, and having a plasticity index between 7.5 and 17.

B Granular Fill: Granular fill shall include clean, natural or prepared gravels, gravel-sand mixtures, sands or gravelly sands with little or no fines. A minimum of 95% shall be retained on a No. 200 sieve.

C Pea Gravel: Pea gravel shall consist of clean, hard, round particles of crushed stone, crushed or uncrushed gravel with the following gradation:

Sieve Size	Percent Passing
3/8 inch	85 - 95
#4	55 - 15
#8	0 - 2

D Crushed Rock: Crushed rock shall consist of clean, hard, particles of crushed limestone, dolomite, granite, quartzite, or other approved rock. It shall have a percentage of wear of not more than 45 and a percent loss of not more than 30 at the end of 16 cycles of the freezing and thawing test. Gradation for crushed rock shall be as follows:

Sieve Size	Percent Retained
1-1/2 inch	0
3/4 inch	5 - 35
3/8 inch	30 - 64
#10	70 - 90
#200	900 - 100

PART 3 EXECUTION

3.1 GENERAL

A Fabrication, erection, and installation of the complete system shall be done by qualified personnel experienced in such work and shall proceed in an orderly manner so as not to hold up the progress of the project.

B The Contractor shall check all areas and surfaces where plumbing equipment or materials are to be installed and report any unsatisfactory conditions before starting work.

C Commencement of work signifies the Contractor's acceptance of the conditions as fit and proper for the execution of the plumbing work.

D Equipment and systems shall be installed in accordance with manufacturer's instructions, requirements, or recommendations.

3.2 DELIVERY AND STORAGE OF MATERIALS

A Take provisions for the delivery and safe storage of materials and shall make the required arrangements with other Contractors for the introduction into the building of equipment too large to pass through finished openings.

B Materials shall be delivered at such stages of the work as will expedite the work as a whole and shall be marked and stored in such a way as to be easily checked and inspected.

C All items subject to cold weather damage shall be protected by covering, insulating, or storing in a heated space.

3.3 COOPERATION WITH OTHER CONTRACTORS

A Perform the work in conformance with the construction called for by other trades and afford other Contractors reasonable opportunity for the execution of their work.

B Properly connect and coordinate the work with the work of other Contractors at such time and in such a manner as not to delay or interfere with their work.

C Examine the contract documents for the General, Mechanical, and Electrical work and the work of other trades. Coordinate work accordingly.

D Promptly report to the Architect any delay or difficulties encountered in the installation of the plumbing work which might prevent prompt and proper installation of work required from other trades.

3.4 COORDINATION OF WORK

A The list below is the precedence of assigned work items for space priority in descending order. Items not listed shall have the same precedence as similar items:

1. In areas with finished ceilings: Reflected ceiling with all light fixtures, access above light fixtures required for maintenance, sprinkler head locations, and all ceiling fixtures and devices.
2. Gravity flow plumbing waste, roof drainage, and other systems that rely upon gravity for flow.
3. Ductwork and appurtenances, except that external bracing shall be relocated to accommodate local interference.
4. In open and exposed areas: Exposed and surface mounted light fixtures and signs.
5. Fire sprinkler piping.
6. Cable tray with access identification 8 inches horizontal to 6 inches above tray.
7. Electrical conduit over 2 inches in diameter.
8. HVAC piping except for pressurized domestic water piping.
9. Plumbing vents.
10. Electrical conduit under 2 inches in diameter.

B Plan all work so it proceeds with a minimum of interference with other trades.

C It shall also be the responsibility of the Contractor to inform the all contractors of all openings required in the building construction for the installation of the plumbing work.

D The Contractor shall cooperate with all other contractors in furnishing material and information, in proper sequence, for the correct location of all sleeves, inserts, foundations, wiring, etc.

E Provisions shall be made for all special frames, openings, and sleeves as required.

F The Contractor shall pay for extra cutting and patching made necessary by their failure to properly direct such work at the correct time.

3.5 ELECTRICAL WIRING

A Install wiring in accordance with National Electrical Code and ANSI/NFPA 70.

B Install wiring (low and line voltage) in metal raceways or conduit unless inside control cabinet or unit enclosures. For concealed and accessible areas, plenum-rated wiring and cabling may be used.

C Class 2 wiring not installed in conduit shall be supported every five feet from the building structure utilizing metal hangers designed for this application. Wiring shall be installed parallel to the building structural lines. All wiring shall be installed in accordance with local code requirements. Exposed wiring shall only be allowed in concealed accessible locations.

D Low voltage control wiring and 24 VAC can be run in the same conduit. Power wiring 120 VAC and greater must be in a separate conduit.

E Fastening shall be secured to walls or ceilings by means of appropriate screws, expansion screws anchors, toggle bolts, hollow wall screw anchors, nylon expansion anchors, or expansion shields. All-purpose plastic anchors are not acceptable.

F Control panels shall be mounted on vibration-free walls or freestanding structural supports. Panels shall be located as indicated or approved by the Owner's Representative.

G Locate circuits, relays, transformers, or other equipment that contains or must be connected to voltages exceeding 130 volts, in separate cabinets, which may be adjacent to control panels; permanently label "DANGER 277 VOLTS" or appropriate volts.

H All wiring in mechanical rooms shall be in conduit. Minimum control wiring conduit size shall be 3/4 inch.

3.6 CONTROL AND POWER WIRING

A Provide all incidental wiring required to make the fixtures, equipment or systems fully operational. Coordinate with equipment manufacture incidental power and control wiring requirements.

B Incidental wiring includes but not limited to:
1. Plumbing Fixture power and control:
    a. Faucets

b. Flush valves
c. Transformers
d. Flow switches
e. Alarms

2. Water Heaters
3. Automated flue exhaust system
4. Equipment Motors Starters
5. Manual Multi-Speed Switches (Furnished as an Accessory to Plumbing Equipment)
6. Pushbutton Stations and Emergency Stop Switches
7. Pumps
8. Remote Monitoring and Control Panels (Provided by Equipment Manufacturers)
9. Gas and utility emergency shut-off system

3.7 LAYING OUT WORK

A Carefully lay out all work in advance of installation using data and measurements from the site, the appropriate architectural and structural drawings, and shop drawings.

B Equipment layout and all system layouts shall confirm adequate clearances for installation, operation, maintenance, and code-required clearances from the structure or other equipment and systems.

C Provide offsets and elevation changes in piping as required to complete the Layout and Coordination Process. Offsets and elevation change information shall be indicated in the coordination process documentation and must be submitted for review.

D The layout shall not cause problems of operation, maintenance, or clearance for items installed by other Contractors.

E Prior to installation of any work, make certain the location does not conflict with other items in or near the same location.

F If the layouts so prepared indicate that the required conditions cannot be met in the space provided, inform the Architect prior to installation and shall request clarification.

G Failure to properly coordinate and lay out the work will require correction by the Contractors at their own expense.

3.8 DATA AND MEASUREMENTS

A Drawings are diagrammatic or schematic. Do not scale drawings.

B The data given herein and on the drawings is as accurate as could be secured; absolute accuracy is not guaranteed.

C Obtain exact locations, measurements, levels, etc., at the site and shall adapt their work to actual conditions.

D Examine the general construction, mechanical, electrical, and other applicable drawings and the Specifications.

E Only architectural drawings, structural drawings, and site measurements may be utilized in calculations.

F Layout and coordinate all work prior to installation to provide clearances for operation, maintenance and codes. Verify non-interference with other work.

3.9 POSITION OF DEVICES

A Locate devices mounted on finished surfaces with regard to paneling, furring, trim, etc. Where several devices occur in a room, they shall be symmetrically arranged as reviewed by the Architect.

B Devices improperly located or installed shall be repaired, replaced or relocated at the Contractor's expense.

C Devices shall be set plumb or horizontal and shall extend to the finished surface of the wall, ceiling, or floor without projecting beyond the surface.

D Devices shown on wood trim, cases, or other fixtures shall be installed symmetrically and, where necessary, shall be set with the long dimension of the plate horizontal.

E Coordinate their respective devices so as not to destroy the aesthetic effect of the surface in which the devices are mounted.

F Coordinate the locations of all plumbing items with work furnished by other trades to avoid interference.

G If the required coordination is not done, the outlets or devices shall be removed and relocated if so directed by the Architect and the damaged surfaces repaired at the Contractor's expense.

H Devices shall be installed at the height shown below unless otherwise noted. All heights of devices are measured from finished floor to centerline of device.

I Heights may be adjusted to correspond to nearest masonry course or as necessary to clear wall-mounted cabinets, fin tube convectors, unit heaters, etc.
1. Control panels 48 inches.

3.10 PROTECTION OF APPARATUS

A Take such precautions as necessary to properly protect all apparatus, fixtures, appliances, material, equipment, and installations from damage of any kind.

B Failure to provide such protection to the satisfaction of the Architect shall be sufficient cause for the rejection of any particular piece(s) of material, apparatus, equipment, etc., concerned.

3.11 ACCESS TO EQUIPMENT

A All motors, valves, control devices, specialties, etc., shall be located to provide for easy access for operation, repair and maintenance; if concealed, access doors shall be provided.

B Access doors required for access to equipment requiring inspection or service shall be provided.

C Provide all access doors not already furnished by other Contractors but which are required for access to plumbing equipment.

D Doors shall be 12 inches by 12 inches unless shown otherwise.

E Person access doors shall be 18 inches by 18 inches minimum.

3.12 EXAMINATION OF PREMISES

A Examine the premises and all conditions thereon and/or therein. The bid proposal shall take into consideration all such conditions which may affect the work under this contract.

3.13 ROADWAYS, CURBS, AND WALKS

A Use every possible precaution to prevent injuries to roadways, curbs, and walks on or adjacent to the site of the work.

B Any damage shall be repaired at the Contractor's own expense. This shall also include damage necessary for installation of the plumbing work.

3.14 INSULATION

A Continue pipe insulation through walls, floors, sleeves, hangers, and other penetrations.

B Insulate pipe fittings, joints, valves, unions, flanges, strainers, flexible connections and expansion joints with insulation of like material and thickness as adjoining pipe.

C Provide insulation jackets and/or covers as indicated.

3.15 PIPING SYSTEMS - COMMON REQUIREMENTS

A General: Install as described below, unless individual Sections specify otherwise. Individual Sections specify unique installation requirements.

B Refer to The Plumbing Fixture Schedule for all plumbing piping connection sizes to all plumbing fixtures.

C Wall hydrants and downspout nozzles shall be installed between 18" and 24" above finished grade. Provide accessible shutoff valve located indoor for each wall hydrant.

D Piping in exterior building walls shall be located on the warm side of building insulation and vapor barrier. Building insulation shall run continuous between piping and exterior of building.

E PVC piping shall not be installed in return air plenums.

F General Locations and Arrangements:

1. Drawing plans, schematics, and diagrams indicate general, diagrammatic location and arrangement of systems.
2. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
3. Install systems as indicated, unless deviations to layout are approved on Coordination Drawings.
4. Provide offsets and elevation changes in piping and conduit as required to complete the Layout and Coordination Process. Offsets and elevation change information shall be indicated in the coordination process documentation and must be submitted for review.
5. Refer to architectural exterior and interior elevations for wall mounted device locations.
6. Do not run piping above electrical or telecom panels or in code required clearance spaces.
7. Do not run piping and plumbing above or through information technology and data closets, IDF, and MDF rooms or associated riser rooms. Coordinate all routing with other trades.
8. Coordinate location of piping with electrical cable tray. Provide a minimum of 6" of clear access above cable tray for installation of cables.
9. Install all horizontal piping in mechanical rooms at a minimum of 7'-6" above finished floor.
10. Install exposed interior and exterior piping at right angles or parallel to building walls.
    a. Diagonal runs are prohibited, unless otherwise indicated.
11. Conceal piping in walls, pipe chases, utility chases, above ceilings, below grade or floors, unless otherwise noted, except in mechanical rooms or service areas.
12. Install piping to allow application of insulation plus 1-inch clearance around insulation.
13. Pipe hangers for insulated pipe with vapor barrier jackets shall be installed around the outside of the insulation and a metal insulation support shield provided to prevent crushing of the insulation.
14. Locate groups of pipes parallel to each other, spaced to permit insulation and valve servicing.
15. Dielectric nipples or flange insulation kits shall be utilized for all dissimilar pipe connections. Dielectric unions will not be accepted.
16. Install piping at indicated slope and as required by code.
17. Provide components with pressure rating equal to or greater than system operating pressure.
18. Install fittings for changes in direction and branch connections.
19. Install piping free of sags or bends with ample space between piping to permit proper insulation applications.
20. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building unless otherwise indicated.
    a. Allow sufficient space above ceiling panels to allow for ceiling panel removal.
21. Install piping to allow for expansion and contraction without stressing pipe, adjacent building structure or connecting equipment.
    a. Provide expansion loops or compensators where indicated.
22. Do not use ceiling support system to bear weight of devices or systems unless ceiling support system is certified as suitable to do so.
23. During construction, avoid any undue loads, forces or strains on valves, equipment, pumps flanges, or building elements with piping connections or piping systems.
24. Keep all pipe and equipment openings closed during construction except when actual work is being performed on that item or system.

25. Leaking pipe joints shall be remade using new materials.

G Clean existing underground sanitary piping with cable and blade to first manhole prior to installation and connection of new piping.

H Provide wall- and floor mounted sewer cleanouts as required by code. Coordinate location in field.

I Locate plumbing vents through the roof at a minimum of 10'-0" away from all outdoor air intakes on HVAC equipment or operable windows.

J Terminate all natural gas flue vents a minimum of 2'-0" higher than any surface or equipment within 10'-0" or as required by code.

K Provide shut-off valves for water supply at all equipment items.

L Coordinate finish floor elevations to set floor drains and floor sinks.

M Saw cut and remove floor as required for installation of new piping.

N Contractor is responsible for any cutting and patching needed for plumbing installation. Patching must match existing.

O Verify final equipment locations for roughing-in of all systems.

P Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.16 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A Install equipment to provide maximum possible headroom while maintaing accessible ladder access, if mounting heights are not indicated.

B Install equipment according to manufacturer's requirements and submittal data. Portions of the Work are shown only in diagrammatic form. Refer conflicts to Architect.

C Provide access space around terminal units and heat pumps as required per manufacturers' recommendations. Do not route piping under terminal unit or heat pump.

D Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

E Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components.

F Connect equipment for ease of disconnecting, with minimum interference to other installations.

G Install equipment giving right of way to piping installed at required slope.

H Install flexible connectors on equipment side of shutoff valves, horizontally and parallel to equipment shafts if possible.

3.17 CONCRETE BASES AND HOUSEKEEPNG PADS

A Anchor equipment to concrete base or pads according to equipment manufacturer's written instructions and according to applicable seismic codes.
1. Provide bases and pads of dimensions and locations indicated, but not less than 6" larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.18 EXCAVATION

A Perform excavation of every description and of whatever substances encountered, to the depths required or indicated on the drawings, in accordance with OSHA.

B During excavation, deposit material suitable for backfill in an orderly manner a sufficient distance from the excavation banks to avoid overloading and to prevent slides or cave-ins.

C Dispose of material unsuitable for backfill as directed by the Architect.

D Grade as necessary to prevent surface water from flowing into trenches or other excavations, and remove any water accumulating therein by pumping or by other acceptable method.

E Fill any excess excavation below the levels indicated for structures or raceways with sand, gravel or concrete.

F Unsuitable Material:
1. Where the bottom of the trench is found to be unstable or to include ashes, cinders, any types of refuse, vegetable or other organic material, or large pieces or fragments of inorganic material, which in the judgment of the Architect should be removed, excavate and remove such unsuitable material to a minimum depth of 12 inches below the piping.
2. Backfill the trench with selected bedding material and compact to provide uniform and continuous bearing for the piping.
3. Dispose of the unsuitable material.

G Shoring Requirements:
1. Perform shoring and sheeting that is required to protect the excavation and to safeguard employees in accordance with OSHA.
2. Widen excavation to provide for space occupied by shoring and sheeting.

3. Shoring shall meet the requirements of applicable codes and regulations.

H Dewatering:
1. Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.
2. Do not allow water to accumulate in excavations.
3. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.
4. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
5. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or runoff areas.
6. Do not use trench excavations as temporary drainage ditches.

3.19 BACKFILL

A Do not backfill until required inspections are made and tests are performed for the specific utility.

B Backfill with the excavated materials specified for backfilling, consisting of earth, loam, sandy clay, sand and gravel or other materials, free from large clods of earth or stones.

C Do not use broken concrete as backfill materials.

D Do not backfill in freezing weather or with frozen material.

E Adjust the moisture content of the backfill material if required for proper compaction.

F Reopen any trenches improperly backfilled, or where settlement occurs, to the depth required for proper compaction, refill and compact to specified density.

G Compact backfill for structures to the specified density.

H During the backfilling of each exterior underground piping system, install continuous underground type plastic line markers.
1. Locate markers directly over the buried piping at 12 inches to 18 inches below finished grade.
2. Where multiple small piping are buried in common trenches and do not exceed an overall trench width of 16 inches, install a single line marker.

I Deposit suitable backfill material around the piping in 6-inch layers and thoroughly compact by hand, machine tamper, or other suitable equipment.

J Backfill to at least 90 percent of maximum density at optimum moisture content determined by ASTM D698 until the piping has a minimum cover of 2 feet.

K The moisture content of the soil at time of compaction shall be not more than 3 percent above or 3 percent below the optimum.

L Be careful not to disturb the piping.

M Carry backfilling on simultaneously on both sides of the piping to eliminate the possibility of lateral displacement.

N Return surface to original condition.

3.20 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

B Field Welding: Comply with AWS D1.1, "Structural Welding Code--Steel."

3.21 INCIDENTAL WORK

A The following incidental work shall be furnished by the designated contractor under the supervision of the Temperature Control Contractor:
1. The Piping Contractor shall provide all necessary valved pressure taps, water, drain, and overflow connections and piping.
2. The Piping Contractor shall provide all necessary piping connections required for flow devices, valve position indicators, etc.
3. The Electrical Contractor shall provide power wiring to the variable frequency controller.

3.22 EQUIPMENT AND SYSTEM SOFTWARE INTERFACES TO THE BMCS

A Contractor shall coordinate with the BMCS Contractor to determine the points that are to be mapped from the equipment and systems to the BMCS. Contractor shall provide details of the method of integration and the information to be transferred between the systems as part of the submittal package.

B Contractor shall provide the necessary software communication ports specifically for the interfacing of the systems to the BMCS.

C Contractor cannot document that the exact same interface has been performed between the selected BMCS and the equipment and/or system, then the interfaces shall be tested prior to installations at an offsite location. The equipment shall not be installed at the project location until all software interfaces to the BMCS have been successfully demonstrated or documented.

D Documentation regarding the software interfaces shall be provided in sufficient detail as to enable a person reasonably skilled in the writing of real time software applications to add/delete points mapped from one system to the other. The documentation shall include a detailed description of each protocol used and the model, version and firmware details of any protocol converter (gateway) that is used.

E Refer to BMCS specifications for coordination and testing requirements.

3.23 LUBRICATION, TESTING AND TEST REPORTS

A Upon completion of the work, the entire system shall be tested and proven for capacity of equipment and proper operation of controls.

1. Take water flow readings and submit copy of same to demonstrate proper flow according to the performances shown on the plans and noted in the specifications.
2. Motors shall be checked for overload and belts adjusted.
   a. Align pulleys and install belts according to manufacturer's written instructions.
   b. Tension according to manufacturer's written instructions.
3. Lubricate moving parts and clean or replace filters.
   a. Run in all bearings and, after they are run in, drain and flush bearings and refill with a new oil charge.
   b. Equipment shall be so arranged that tools (screwdrivers, wrenches, etc.) will not be required to make lubrication points accessible.
   c. Extensions on grease or oil fittings shall be provided where required for access to lubricate.
4. Test piping systems per applicable codes and standards.
5. Submit copies of all tests to the Architect for review prior to date of substantial completion.
6. Equipment and systems discrepancies shall be corrected prior to final acceptance.

END OF SECTION

SECTION 220513

COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A General construction and requirements.

B Applications.

C Single phase electric motors.

D Three phase electric motors.

E Electronically Commutated Motors (ECM).

F Shaft Grounding.

1.2 REFERENCE STANDARDS

A ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings.

B IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators.

C NEMA MG 00001 - Motors and Generators.

D NFPA 70 - National Electrical Code.

1.3 SUBMITTALS

A Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.

B Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

C Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.4 QUALITY ASSURANCE

A Comply with NFPA 70.

B Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A Baldor Electric Company/ABB Group: www.baldor.com.

B General Electric.

C Leeson Electric Corporation: www.leeson.com.

D Regal-Beloit Corporation (Century): www.centuryelectricmotor.com.

E U.S. Motors.

F Or pre-approved equivalent.

2.2 GENERAL CONSTRUCTION AND REQUIREMENTS

A Construction:
1. Open drip-proof type except where specifically noted otherwise.
2. Design for continuous operation in 104 degrees F environment.
3. Design for temperature rise in accordance with NEMA MG 00001 limits for insulation class, service factor, and motor enclosure type.

B Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.

C Wiring Terminations:
1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.3 APPLICATIONS

A Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.

B Single phase motors for centrifugal pumps: Split phase type.

C Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.

D Single phase motors for pumps and air compressors: Capacitor start type.

E Single phase motors for pumps: Capacitor start, capacitor run type.

F Motors located in exterior locations, humidifiers, direct drive axial fans, roll filters, explosion proof environments, and dust collection systems: Totally enclosed type.

G Motors located in outdoors, in wet air streams downstream of sprayed coil dehumidifiers, in draw through cooling towers, and in humidifiers: Totally enclosed weatherproof epoxy-treated type.

H Motors located outdoors: Totally enclosed weatherproof epoxy-sealed type.

2.4 SINGLE PHASE POWER - SPLIT PHASE MOTORS

A Starting Torque: Less than 150 percent of full load torque.

B Starting Current: Up to seven times full load current.

C Breakdown Torque: Approximately 200 percent of full load torque.

D Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.

E Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.5 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

A Starting Torque: Exceeding one fourth of full load torque.

B Starting Current: Up to six times full load current.

C Multiple Speed: Through tapped windings.

D Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.6 SINGLE PHASE POWER - CAPACITOR START MOTORS

A Starting Torque: Three times full load torque.

B Starting Current: Less than five times full load current.

C Pull-up Torque: Up to 350 percent of full load torque.

D Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.

E Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.

F Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.7 THREE PHASE POWER - SQUIRREL CAGE MOTORS

A Design, Construction, Testing, and Performance: Comply with NEMA MG 00001 for Design B motors.

B Insulation System: NEMA Class B or better.

C Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.

D Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.

E Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

F Sound Power Levels: To NEMA MG 00001.

G Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.

H Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.

I Nominal Efficiency: NEMA MG 1-2006 Premium.

J Inverter Duty: NEMA MG 1 Part 31.4.4.2.

2.8 ELECTRONICALLY COMMUTATED MOTORS (ECM)

A Manufacturers:
1. US Motors, a brand of NIDEC Motor Corporation: www.usmotors.com.
2. Or pre-approved equivalent.

B Starting Torque: Exceeding one fourth of full load torque.

C Soft start and soft speed change ramps.

D Breakdown Torque: Approximately 250 percent of full load torque.

E Motors: Synchronous rotation. Variable speed direct current brushless. Permanent magnet type. Near zero rotor losses. Permanently lubricated ball bearings. Integrated controller/inverter operates the wound stator and senses rotor position to electronically commutate the stator.

F Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.9 SHAFT GROUNDING

A Manufacturers:
1. AEGIS SGR
2. Helwig Carbon Products
3. Or pre-approved equivalent.

B Shaft grounding system for each three-phase AC motor to prevent electrical damage to motor bearings and to extend motor life by safely channeling harmful shaft currents to ground.

C Provide shaft grounding on all motors controlled by variable frequency controllers and as indicated.

D Electrographite construction. Integral shunt with quick disconnect terminal and mount.

E Continuous spring loaded brush holder, conductive carbon brush or carbon fiber ring technology.

F Replaceable without motor removal or uncoupling..

G Internal:
1. Integral to motor housing.

H External:
1. Bolted to motor exterior.
2. Slide ring over the end of the motor shaft and locking it in place with screw on mounting brackets.

PART 3 EXECUTION

3.1 INSTALLATION

A Install in accordance with manufacturer's instructions.

B Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

C Provide shaft grounding on all motors controlled by variable frequency controllers and as indicated.

D Check line voltage and phase and ensure agreement with nameplate.

3.2 SCHEDULES

A NEMA Open Motor Service Factors.
1. 3/4 hp:

a. 3600 rpm: 1.25.
b. 1800 rpm: 1.25.
c. 1200 rpm: 1.15.
d. 900 rpm: 1.15.

2. 1 hp:
   a. 3600 rpm: 1.25.
   b. 1800 rpm: 1.15.
   c. 1200 rpm: 1.15.
   d. 900 rpm: 1.15.
3. 1.5-150 hp:
   a. 3600 rpm: 1.15.
   b. 1800 rpm: 1.15.
   c. 1200 rpm: 1.15.
   d. 900 rpm: 1.15.

END OF SECTION

SECTION 220517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A Pipe sleeves.

B Pipe sleeve-seals.

C Escutcheons.

D Exterior penetration accessories.

1.2 REFERENCE STANDARDS

A ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).

B ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.

1.3 SUBMITTALS

A Specification Compliance Review.

B Shop Drawings: Provide data on devices including manufacturer catalog information indicating pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation and layout with rough-in details, weights, mounting and support details, performance ratings, and piping connections.

C Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

D Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.4 QUALITY ASSURANCE

A Company specializing in manufacturing the Products specified in this section.

B Installer Qualifications: Company specializing in performing work of the type specified this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.

B Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

PART 2 PRODUCTS

2.1 PIPE SLEEVES

A Vertical Sleeves:
1. Extend sleeves 2 inches above the finished floor. This includes all mechanical rooms, back-of-house areas and concealed spaces inside wall and chase cavities.
2. Sleeves for piping installed exposed in finished public spaces shall be reduced to extend 1/4" above the finished floor.
3. Provide sealant for watertight joint between the sleeve and floor.

B Horizontal Sleeves:
1. Cut flush with both wall face surfaces.

C Sheet Metal Sleeves:
1. Galvanized 16 gauge steel sheet: round tube closed with welded longitudinal joint for pipes penetrating fire-rated walls, unless otherwise specified by the manufacturer for a UL listed firestopping system.
2. Galvanized 22 gauge steel sheet: round tube closed with welded longitudinal joint for pipes penetrating non-fire-rated walls.

D Steel Pipe Sleeves:
1. ASTM A53, Type E, Grade B.
2. Galvanized Schedule 40 or standard weight.
3. Plain ends.
4. Sleeves supporting vertical riser piping 3” and larger shall have three (3) 6” long reinforcing rods welded to the sleeve radially at 120° spacing. The sleeves shall be installed with the rods embedded in the concrete slab.

E Iron Pipe Sleeves:
1. Cast or ductile-iron pressure pipe.
2. Asphaltic, zinc or galvanized coating.
3. Plain ends and integral waterstop.

F Clearances:
1. Provide allowance for insulated piping.
2. Wall, Floor, and Partitions: 1 inch greater than external pipe diameter.
3. Beam Web:
   a. Non-sloping piping: 1 inch greater than external pipe diameter, unless a reduced gap is required by the structural engineer.
   b. Sloping piping: Minimum 1 inch greater than external pipe diameter. This shall be increased to account for the pipe fall through the beam when the width necessitates.
4. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases. All requirements to achieve a UL listed system shall be followed.

2.2 PIPE-SLEEVE SEALS

A Modular Mechanical Sleeve-Seal:
1. Elastomer-based interlocking links continuously fill annular space between pipe and wall-sleeve, wall or casing opening.
2. Watertight seal between pipe and wall-sleeve, wall or casing opening.
3. Size and select seal component materials in accordance with service requirements.
4. Glass-reinforced plastic pressure end plates.
5. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 ESCUTCHEONS

A Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C One-Piece, Cast Brass Type: With set screw.
1. Finish: Polished chrome-plated.

D Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
1. Finish: Polished chrome-plated.

E One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F Split-Plate, Stamped-Steel Type: With concealed hinge, set screw or spring clips, and chrome-plated finish.

G One-Piece, Floor-Plate Type: Cast-iron floor plate.

H Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.4 EXTERIOR PENETRATION ACCESSORIES

A Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

B Roof Drain Outlet Pipe Connection: Drain seal to connect roof drain to drain piping.

C Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for piping, cables, and roofing system to be installed; designed to accommodate existing penetrations where applicable.

PART 3 EXECUTION

3.1 INSTALLATION

A Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B Install piping to conserve building space, to not interfere with use of space and other work.

C Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D Build sleeves into new walls and slabs as work progresses.

E Structural Considerations:
1. Penetrations in beam webs are permitted where specifically noted by the structural engineer, but are prohibited through ribs or flanges without additional reivew and approval from the structural engineer.

F Provide sleeves when penetrating footings, floors, walls, and partitions. Seal where the sleeves are in contact with the building feature being penetrated.
1. Underground Exterior-Wall Piping Penetrations:
   a. Install pipe sleeves.
   b. Seal pipe penetrations using modular mechanical sleeve-seals. Assemble and install according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.
   c. Provide a single watertight seal between the sleeve and pipe when the wall is less than 16" thick.
   d. Provide a watertight space with seals between the sleeve and pipe on both sleeve ends when wall is 16" thick or greater.
2. Aboveground Non-Rated Interior-Wall Piping Penetrations:
   a. Install sheet metal metal sleeves.
   b. Pack solid using mineral fiber complying with ASTM C592.
   c. Fill space at each end of the sleeve with an elastomer caulk to a depth of 0.50 inch.
3. Aboveground Rated Interior-Wall Piping Penetrations:
   a. Install sheet metal sleeves.
   b. Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
   c. Install all materials complete, attached securely and permanently in place in accordance with manufacturers' printed directions. All requirements to achieve a UL listed firestopping systemshall be followed.
   d. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing any openings.
   e. Do not cover installed firestopping until inspected by authority having jurisdiction.
   f. Provide labeling required by code.
4. Aboveground Exterior-Wall Piping Penetrations:
   a. Install steel pipe sleeves when smaller than 6 inches in diameter.
   b. Install iron pipe sleeves when 6 inches in diameter and larger.

c. Caulk pipe sleeve watertight with lead and oakum or mechanical sleeve seals. Assemble and install mechanical sleeve seals according to manufacturer's written instructions. Tighten bolts that cause rubber sealing elements to expand and make watertight seal.

5. Concrete Beam Web Penetrations:
   a. Install steel pipe or iron pipe sleeves.
6. Aboveground Floor Penetrations:
   a. Install steel pipe or iron pipe sleeves.
   b. Connect sleeve with floor plate.
   c. In rated floor penetrations, caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
   d. In rated floor penetrations, install all materials complete, attached securely and permanently in place in accordance with manufacturers' printed directions. All requirements to achieve a UL listed firestopping assembly shall be followed. Provide labeling required by code.
   e. For pipes penetrating floors with membrane waterproofing, extend black iron sleeve fittings above and below the floor slab as required to secure flashing between clamping flanges. Seal space outside of sleeve fittings with nonshrink, nonmetallic grout.
   f. Sleeves set in concrete floor construction which do not support piping may be reduced to 16 gauge galvanized steel, unless otherwise specified by the manufacturer for a UL listed firestopping system.

G Manufactured Sleeve-Seal Systems:
1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

H When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

I Seal between the sleeves and pipes as required to limit general noise transfer between spaces.

J Seal and provide packing between the sleeves and pipes in sensitive locations as required to provide an acoustical separation and achieve the sound transmission criteria of the building feature being penetrated.

K Seal between the sleeves and pipes as required to achieve the smoke resistance equivalent to smoke rated floors, walls, and partitions.

L Seal between the sleeves and pipes as required to achieve the fire resistance equivalent to fire rated floors, walls, and partitions.

M All sleeves and frames shall be securely fastened to the walls. Provide for structural lintels in masonry wall openings.

N Sleeves are not required for core drilled holes through solid concrete walls unless required for a complete UL listed firestopping system.

3.2 FINISHED SURFACES PENETRATIONS

A All piping penetrations of finished surfaces shall have escutcheons and/or closure plates according to the following:
1. Chrome-Plated Piping: Cast brass, one piece, with set screw, and polished chrome-plated finish. Use split-casting escutcheons if required, for existing piping.
2. Uninsulated Piping Wall and Ceiling Escutcheons: Cast brass or stamped steel, with set screw.
3. Uninsulated Piping Floor Plates: Cast-iron floor plates.
4. Insulated Piping Wall and Ce Escutcheons: Cast brass or stamped steel; with concealed hinge, spring clips, and chrome-plated finish.
5. Piping in Mechanical Room and Utility Areas: Cast brass or stamped steel, with set-screw or spring clips.

B Openings shall be cut only as large as required for the installation, sleeves, and/or frames installed flush with finished surfaces and grouted in place.

C Surfaces around openings shall be left smooth and finished to match surrounding surface.

D Pipe sleeves with 2 inch extensions through floors shall be caulked watertight at the sleeve/slab joint. No escutcheon or floor plate is require

E Pipe sleeves in finished areas with 1/4 inch extensions through floors shall be caulked watertight at the sleeve/slab joint. The sleeves shall allow placement of escutcheons or floor plates.

3.3 CLEANING

A Upon completion of work, clean all parts of the installation.

B Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 220519

METERS AND GAGES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A Pressure gauges.

B Thermometers.

1.2 REFERENCE STANDARDS

A ASME B40.100 - Pressure Gauges and Gauge Attachments.

B ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers.

C ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

D NSF 61 - Drinking Water System Components - Health Effects.

1.3 SUBMITTALS

A Product Data: Provide red-marked product data sheets for each furnished item with associated components and accessories.

B Project Record Documents: Record actual locations of components and instrumentation.

C Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Pressure Gauges: One of each type and size.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Minimum Pressure Rating: 150 psig.

B Meters and Gages exposed to outdoor enviroment, water spray or wash shall be provided with weatherproofed cases.

2.2 PRESSURE GAUGES

A Manufacturers:
1. Ashcroft, Inc: www.ashcroft.com/#sle.
2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
3. Dwyer Instruments, Inc: www.dwyer-inst.com.
4. Ernst Gage Co.
5. Marsh Bellofram.

6. Miljoco.
7. Moeller Instrument Co., Inc: www.moellerinstrument.com.
8. Omega Engineering, Inc: www.omega.com.
9. Trerice, H.O. Co.
10. Weiss Instruments, Inc.
11. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
12. WIKA Instrument Corporation.
13. Winters Instruments: www.winters.com/#sle.
14. Or pre-approved equivalent.

B Pressure Gages: ASME B40.100, drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment.
1. Dial Size and Cover: 4-1/2 inch diameter scale with polycarbonate window.
2. Dial Text and Markings: Black color on white background with scaled psi units.
3. Accuracy: ASME B40.100, adjustable commercial grade (D) with 5 percent of span.
4. Scale: 150 Psi.

2.3 THERMOMETERS

A Manufacturers:
1. Dwyer Instruments, Inc: www.dwyer-inst.com/#sle.
2. Moeller Instrument Company, Inc: www.moellerinstrument.com/#sle.
3. Omega Engineering, Inc: www.omega.com.
4. Trerice, H.O. Co.
5. Watts Water Technologies, Inc: www.watts.com/#sle.
6. Weiss Instruments, LLC: www.weissinstruments.com/#sle.
7. Weksler Glass Thermometer Corp: www.wekslerglass.com/#sle.
8. Winters Instruments: www.winters.com/#sle.
9. Or pre-approved equivalent.

B General:
1. Product Compliance: ASTM E1.
2. Lens: Clear glass, except where stated.
3. Accuracy: Two percent, when tested in accordance with ASTM E77, except where stated.
4. Scale: Black markings depicting single scale in degrees F where expected process value falls half-span of standard temperature range.

C Thermometers - Adjustable Angle: 9 inch v-shape aluminum case with clear glass window scale, 3-1/2 inch NPT stem, red or blue organic non-toxic liquid filled glass tube, and adjustable joint with positive locking device allowing 360 degrees in horizontal plane or 180 degrees in vertical plane adjustments.

D Thermometers - Dial Type:
1. Adjustable Angle: 5 inch diameter dial with black pointer, stainless steel case, silicone damping bimetal element, hermetically sealed lens, recalibrating screw, and 2-1/2 inch NPT stem.

E Thermometer Supports:

1. Manufacturers: Same as manufacturer of thermometer being used.
2. Description: Pressure-tight, socket-type brass fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

PART 3 EXECUTION

3.1 EXAMINATION

A Verification of Conditions: Verify Utility Service Provider piping readiness to receive meter.

B Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports, and test plugs.

3.2 INSTALLATION

A Install pressure gauges as follows:
1. At Pumps: Place single gauge before strainer, suction side and discharge side.
2. Include gauge cock to isolate each gauge and extend nipples for insulation clearance.
3. Adjust gauges to selected viewing angle, clean thoroughly, and calibrate to zero.

B Install thermometers as follows:
1. Water Heaters: Place upstream and downstream of heater. Add one on the inlet end when using steam as the water heating medium.

C Install thermometer sockets for all thermometers, controls system thermostat, transmitter, or sensor sockets.

D Locate PT (pressure-temperature) test plugs adjacent to control device sockets.

3.3 SCHEDULES

A Pressure Gauges, Location and Scale Range:
1. Pumps, 0 to 100 psi.
2. Expansion tanks, 0 to 100 psi.
3. Pressure reducing valves, 0 to 100 psi.
4. Backflow preventers, 0 to 100 psi.

B Stem Type Thermometers, Location and Scale Range:
1. Domestic hot water supply and recirculation, 0 to 160 degrees F.
2. Domestic cold water supply, 0 to 120 degrees F.
3. Where shown on plans and details, 0 to 160 degrees F

C Thermometer Sockets, Location:
1. All thermometers

END OF SECTION

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SECTION 220523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A Angle valves.

B Ball valves.

C Butterfly valves.

D Check valves.

E Gate valves.

F Globe valves.

G Lubricated plug valves.

1.2 ABBREVIATIONS AND ACRONYMS

A CWP: Cold working pressure.

B EPDM: Ethylene propylene copolymer rubber.

C NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D NRS: Non-rising stem.

E OS&Y: Outside screw and yoke.

F PTFE: Polytetrafluoroethylene.

G RS: Rising stem.

H TFE: Tetrafluoroethylene.

I WOG: Water, oil, and gas.

1.3 REFERENCE STANDARDS

A ASME B1.20.1 - Pipe Threads, General Purpose, Inch.

B ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

C ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24 Metric/Inch Standard.

D ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves.

E ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

F ASME B16.34 - Valves — Flanged, Threaded, and Welding End.

G ASME B31.9 - Building Services Piping.

H ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators.

I ASTM A48/A48M - Standard Specification for Gray Iron Castings.

J ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

K ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

L ASTM A536 - Standard Specification for Ductile Iron Castings.

M ASTM B61 - Standard Specification for Steam or Valve Bronze Castings.

N ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.

O AWWA C606 - Grooved and Shouldered Joints.

P MSS SP-45 - Drain and Bypass Connections.

Q MSS SP-67 - Butterfly Valves.

R MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends.

S MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends.

T MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service.

U MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends.

V MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves.

W MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends.

X MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

Y MSS SP-125 - Check Valves: Gray Iron and Ductile Iron, In-Line, Spring-Loaded, Center-Guided.

Z NSF 61 - Drinking Water System Components - Health Effects.

AA NSF 372 - Drinking Water System Components - Lead Content.

1.4 SUBMITTALS

A Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

B Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

C Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

D Maintenance Materials: Furnish Owner with one wrench for every five plug valves, in each size of square plug valve head.

1.5 QUALITY ASSURANCE

A Manufacturer:
1. Obtain valves for each valve type from single manufacturer.

B Welding Materials and Procedures: Comply with ASME BPVC-IX.

1.6 DELIVERY, STORAGE, AND HANDLING

A Prepare valves for shipping as follows:
1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
2. Protect valve parts exposed to piped medium against rust and corrosion.
3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.

B Use the following precautions during storage:
1. Maintain valve end protection and protect flanges and specialties from dirt.
   a. Provide temporary inlet and outlet caps.
   b. Maintain caps in place until installation.
2. Store valves in shipping containers and maintain in place until installation.
   a. Store valves indoors in dry environment.
   b. Store valves off the ground in watertight enclosures when indoor storage is not an option.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A All Valve Types:
1. Crane/Stockham Co.; Crane Valve Group: www.cranevalve.com.
2. Ferguson Enterprises Inc: www.fnw.com/#sle.
3. Hammond Valve: www.hammondvalve.com.

4. Milwaukee Valve Company: www.milwaukeevalve.com.
5. Nibco, Inc: www.nibco.com.
6. Watts: www.watts.com.
7. Or pre-approved equivalent.

B Gate, Globe and Angle Valves:
1. American Flow Control: www.american-usa.com
2. Apollo Flow Controls: www.appollovalves.com
3. Conbraco Industries: www.apollovalves.com.
4. Tyco Flow Control: www.tycoflowcontrol.com.
5. Powell: www.powellvalves.com.
6. Victaulic Company[<>]: www.victaulic.com.
7. Or pre-approved equivalent.

C Ball Valves:
1. Apollo Flow Controls: www.appollovalves.com
2. Conbraco Industries: www.apollovalves.com.
3. Grinnell Products, a Tyco Business: www.grinnell.com.
4. Jomar Valves, a division of Jomar Group: www.jomarvalve.com/#sle.
5. Nibco, Inc: www.nibco.com.
6. Shurjoint Piping Products, Inc., a Tyco Business: www.shurjoint.com.
7. Stockham: www.stockham.com.
8. Tyco Flow Control: www.tycoflowcontrol.com.
9. Uponor, Inc.: www.uponorpro.com.
10. Victaulic Company: www.victaulic.com.
11. Viega LLC: www.viega.com/#sle.
12. Watts: www.watts.com.
13. Or pre-approved equivalent.

D Plug Valves:
1. Conbraco Industries: www.apollovalves.com.
2. DeZurick: www.dezurick.com.
3. Homestead Valve: www.homesteadvalve.com.
4. Jamesbury Valves: www.jamesbury.com.
5. Nordstrom Valves: www.petrochemvalve.com.
6. Wheatley Valves: www.wheatleyhvac.com.
7. Or pre-approved equivalent.

E Butterfly Valves:
1. DeZurick: www.dezurick.com.
2. Grinnell Products, a Tyco Business: www.grinnell.com.
3. Keystone Valves: www.keystonevalves.com.
4. Tyco Flow Control: www.tycoflowcontrol.com.
5. Victaulic Company: www.victaulic.com.
6. Wheatley Valves: www.wheatleyhvac.com.
7. Or pre-approved equivalent.

F Check Valves:

1. Apollo Flow Controls: www.apollovalves.com
2. Grinnell Products, a Tyco Business: www.grinnell.com.
3. Powell: www.powellvalves.com.
4. Tyco Flow Control: www.tycoflowcontrol.com.
5. Victaulic Company: www.victaulic.com.
6. Wheatley Valves: www.wheatleyhvac.com.
7. Or pre-approved equivalent.

2.2 APPLICATIONS

A See drawings for specific valve locations.

B Listed pipe sizes shown using nominal pipe sizes (NPS) and nominal diameter (DN).

C Provide the following valves for the applications if not indicated on drawings:
1. Shutoff: Ball, butterfly, gate.
2. Dead-End: Single-flange butterfly (lug) type.
3. Throttling: Provide globe or ball.
4. Swing Check (Pump Outlet):
   a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
   b. 2-1/2 NPS and Larger for Domestic Water: Iron swing check valves with closure control , metal or resilient seat check valves.
   c. 2-1/2 inch and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

D Substitutions of valves with higher CWP classes or WSP ratings for same valve types are permitted when specified CWP ratings or WSP classes are not available.

E Required Valve End Connections for Non-Wafer Types:
1. Steel Pipe:
   a. 2 inch and Smaller: Threaded ends.
   b. 2-1/2 inch to 4 inch: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
   c. 5 inch and Larger: Grooved or flanged ends.
   d. Grooved-End Steel Piping: Grooved.
   e. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
2. Copper Tube:
   a. 2 inch and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
   b. 2-1/2 inch to 4 inch: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
   c. 5 inch and Larger: Grooved or flanged ends.
   d. Grooved-End Copper Piping: Grooved.
   e. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.

F Low Pressure, Compressed Air Valves 150 psi or Less:

1. 2 inch and Smaller:
   a. Bronze and Brass: Provide with solder-joint ends.
   b. Ball: Two piece, full port, brass or bronze with brass trim.
   c. Bronze Lift Check: Class 125, bronze disc.
   d. Bronze Swing Check: Class 125, bronze disc.
   e. Bronze Gate: Class 125, NRS.
2. 2-1/2 inch and Larger:
   a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded or flanged ends.
   b. Iron Single-Flange Butterfly: 200 CWP, NBR Seat, aluminum-bronze disc.
   c. Iron Grooved-End Butterfly: 175 CWP.
   d. Iron Swing Check: Class 125, metal seats.
   e. Iron Grooved-End Swing Check: 300 CWP.
   f. Iron Center-Guided Check: Class 125, compact-wafer, metal seat.
   g. Iron Plate-Type Check: Class 125; single plate; metal seat.
   h. Iron Gate: Class 125, NRS.

G Domestic, Hot and Cold Water Valves:
1. 2 inch and Smaller:
   a. Bronze and Brass: Provide with solder-joint or mechanical press sealed ends.
   b. Bronze Angle: Class 125, bronze disc.
   c. Bronze Ball: Two piece, full port, brass or bronze with brass trim.
   d. Copper Ball: Mechanical press sealed ends.
   e. Bronze Swing Check: Class 125, bronze disc.
   f. Bronze Gate: Class 125, NRS.
   g. Bronze Globe: Class 125, bronze disc.
2. 2-1/2 inch and Larger:
   a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded, flanged, or mechanical press sealed ends.
   b. Iron Ball: Class 150.
   c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, aluminum-bronze disc.
   d. Iron Grooved-End Butterfly: 175 CWP.
   e. Iron Swing Check: Class 125, metal seats.
   f. Iron Swing Check with Closure Control: Class 125, lever and spring.
   g. Iron Grooved-End Swing Check: 300 CWP.
   h. Iron Center-Guided Check: Class 125, full lug, metal seat.
   i. Iron Plate-Type Check: Class 125; single plate; metal seat.
   j. Iron Gate: Class 125, NRS.
   k. Iron Globe: Class 125.

H Sanitary Waste and Storm Drainage Water Valves:
1. 2 inch and Smaller:
   a. Bronze and Brass: Provide with solder-joint or threaded.
   b. Ball: Two piece, full port, brass or bronze with brass trim.
   c. Bronze Swing Check: Class 125, bronze disc.
   d. Bronze Gate: Class 125, NRS.
   e. Bronze Globe: Class 125, bronze disc.
2. 2-1/2 inch and Larger:

a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded or flanged ends.
b. Iron Ball: Class 150.
c. Iron Swing Check: Class 125, metal seats.
d. Iron Swing Check with Closure Control: Class 125, lever and spring.
e. Iron Gate: Class 125, NRS.

2.3 GENERAL REQUIREMENTS

A Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
1. Where grooved joints are used in piping, provide grooved valve/equipment connections if available; if not available, provide flanged ends and grooved flange adapters.

B Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

C Valve Sizes: Match upstream piping unless otherwise indicated.

D Valve Actuator Types:
1. Gear Actuator: Quarter-turn valves 8 inch and larger.
2. Handwheel: Valves other than quarter-turn types.
3. Hand Lever: Quarter-turn valves 6 inch and smaller except plug valves.
4. Wrench: Plug valves with square heads.
5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E Insulated Piping Valves: With 2 inch stem extensions and the following features:
1. Gate Valves: Rising stem.
2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: Extended neck.
4. Memory Stops: Fully adjustable after insulation is installed.

F Valve-End Connections:
1. Threaded End Valves: ASME B1.20.1.
2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
3. Pipe Flanges and Flanged Fittings 1/2 inch through 24 inch: ASME B16.5.
4. Solder Joint Connections: ASME B16.18.
5. Grooved End Connections: AWWA C606.

G General ASME Compliance:
1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
2. Solder-joint Connections: ASME B16.18.
3. Building Services Piping Valves: ASME B31.9.

H Potable Water Use:
1. Certified: Approved for use in compliance with NSF 61 and NSF 372.

2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

I Valve Bypass and Drain Connections: MSS SP-45.

J Source Limitations: Obtain each valve type from a single manufacturer.

2.4 BRONZE, ANGLE VALVES

A Class 125: CWP Rating: 200 psig:.
1. Comply with MSS SP-80, Type 1.
2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
3. End Connections: Pipe thread.
4. Stem: Bronze.
5. Disc: Bronze.
6. Packing: Asbestos free.
7. Handwheel: Bronze or aluminum.

2.5 BRASS, BALL VALVES

A General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Two Piece, Full Port and Regular Port with Brass Trim:
1. Comply with MSS SP-110.
2. WSP Rating: 150 psi.
3. WOG Rating: 600 psi.
4. Vacuum Rating: 28.9 in-Hg.
5. Body: Forged brass.
6. Seats: PTFE.
7. Stem: Brass.
8. Ball: Chrome-plated brass.

2.6 BRONZE, BALL VALVES

A General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Two Piece, Full Port with Bronze Trim:
1. Comply with MSS SP-110.
2. WSP Rating: 150 psi.
3. WOG Rating: 600 psi.
4. Body: Forged bronze or dezincified-brass alloy.
5. Ends Connections: Pipe press, thread, or solder.
6. Seats: PTFE or TFE.
7. Stem: Bronze, blowout proof.
8. Ball: Chrome plated brass.

2.7 STAINLESS STEEL, BALL VALVES

A Two Piece, Full Port with Stainless Steel Trim:
1. Comply with MSS SP-110.
2. WSP Rating: 150 psi.
3. CWP Rating: 2,000 psi.
4. Seats: PFTE.
5. Stem: Stainless steel, blowout proof.
6. Ball: Stainless steel, vented.
7. End Connections: Threaded, press, or socket weld.
8. Operator: Lockable handle.

2.8 IRON, BALL VALVES

A Class 125, Full Port, Stainless Steel Trim:
1. Comply with MSS SP-72.
2. CWP Rating: 200 psi.
3. Body: ASTM A536 Grade 65-45-12, ductile iron.
4. End Connections: Flanged or grooved.
5. Seats: PTFE, TFE, or Teflon.
6. Stem: Stainless steel.
7. Ball: Stainless steel.
8. Operator: Lever with locking handle.

2.9 IRON, SINGLE FLANGE BUTTERFLY VALVES

2.10 IRON, GROOVED-END BUTTERFLY VALVES

A CWP Rating: 175 psi.
1. Comply with MSS SP-67, Type I.
2. Body: Coated ductile iron.
3. Stem: Two-piece stainless steel.
4. Disc: Coated ductile iron.
5. Disc Seal: EPDM.

2.11 BRONZE, LIFT CHECK VALVES

A General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Class 125:
1. Comply with MSS SP-80, Type 1, Metal Disc to Metal Seat and Type 2, Nonmetallic Disc to Metal Seat.
2. CWP Rating: 200 psi.
3. Design: Vertical flow.
4. Body: Comply with ASTM B61 or ASTM B62, bronze.
5. End Connections: Threaded or soldered.

6. Disc (Type 1): Bronze.

2.12 BRONZE, SWING CHECK VALVES

A General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Class 125: CWP Rating: 200 psig (1380 kPa).
1. Pressure and Temperature Rating: MSS SP-80, Type 3.
2. Design: Y-pattern, horizontal or vertical flow.
3. Body: Bronze, ASTM B62.
4. End Connections: Threaded or soldered.
5. Disc: Bronze.

2.13 IRON, HORIZONTAL SWING CHECK VALVES

A Class 125:
1. Pressure and Temperature Rating: MSS SP-71, Type I.
2. Design: T-body style for clear or full waterways.
3. WOG Rating: 200 psi.
4. Body: ASTM A126, gray cast iron with bolted bonnet.
5. End Connections: Flanged.
6. Trim: Composition.
7. Seat Ring and Disc Holder: Bronze.
8. Disc: PTFE or TFE.
9. Gasket: Asbestos free.

2.14 IRON, SWING CHECK VALVES WITH CLOSURE CONTROL

A Class 125 with Lever and Spring-Closure Control.
1. Comply with MSS SP-71, Type I.
2. Description:
   a. CWP Rating: 200 psi.
   b. Design: Clear or full waterway.
   c. Body: ASTM A126, gray iron with bolted bonnet.
   d. Ends: Flanged as indicated.
   e. Trim: Bronze.
   f. Gasket: Asbestos free.
   g. Closer Control: Factory installed, exterior lever, and weight.

2.15 IRON, GROOVED-END SWING CHECK VALVES

A Class 300:
1. CWP Rating: 300 psi.
2. Body: ASTM A536, Grade 65-45-12 ductile iron.
3. Seal: EPDM or Nitrile.
4. Disc: Ductile iron.

5. Coating: Black, non-lead paint.

2.16 IRON, CENTER-GUIDED CHECK VALVES

A Class 125, Globe:
1. Comply with MSS SP-125.
2. CWP Rating: 200 psi.
3. Body: ASTM A126 gray iron.
4. Style: Spring loaded.
5. End Connections: Flanged.
6. Metal Seat: Unleaded bronze.

B Class 150, Globe:
1. Comply with MSS SP-125.
2. CWP Rating: 300 psi.
3. Body: ASTM A395/A395M or ASTM A536, ductile iron.
4. Style: Spring loaded.
5. End Connections: Flanged.
6. Metal Seat: Unleaded bronze.

2.17 BRONZE, GATE VALVES

A General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Non-Rising Stem or NRS
1. Pressure-Temperature Range: MSS SP-80, Type I.
2. Class 125:
   a. WSP Rating: 125 psi, saturated.
   b. CWP Rating: 200 psi.
3. Class 150: CWP Rating; 300 psi.
4. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
5. Ends Connections: Threaded or solder.
6. Stem: Bronze.
7. Disc: Solid wedge; bronze.
8. Packing: Asbestos free.
9. Handwheel Operator: Malleable iron.

2.18 IRON, GATE VALVES

A NRS:
1. Pressure and Temperature Rating: MSS SP-70, Type I.
2. Class 125: WOG Rating; 200 psi.
3. Body: ASTM A126, gray iron with bolted bonnet.
4. End Connections: Flanged.
5. Trim: Bronze.
6. Disc: Solid wedge.

7. Packing and Gasket: Asbestos free.

2.19 BRONZE, GLOBE VALVES

A General:
1. Fabricate from dezincification resistant material.
2. Copper alloys containing more than 15 percent zinc are not permitted.

B Class 125 and Class 250:
1. Class 125:
   a. WOG Rating: 200 psi.
   b. WSP Rating: 125 psi, saturated.
2. Class 250: WOG Rating; 300 psi.
3. Comply with MSS SP-80, Type 1.
4. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
5. End Connections: Threaded or solder.
6. Bonnet: NRS; Non-rising Stem.
7. Non-Rising Stem: Bronze.
8. Disc: PTFE.
9. Packing: Asbestos free.
10. Handwheel Operator: Malleable iron.

2.20 IRON, GLOBE VALVES

A Class 125 and Class 250:
1. Class 125, WOG Rating: 200 psi.
2. Class 250, WOG Rating: 500 psi.
3. Comply with MSS SP-85, Type I.
4. Body: Gray iron; ASTM A126, with bolted bonnet.
5. Connection Ends: Flanged.
6. Trim: Bronze.
7. Packing and Gasket: Asbestos free, adjustable.
8. Operator: Handwheel or chainwheel.
9. Pressure and Temperature Rating: ASME B16.1.

2.21 LUBRICATED PLUG VALVES

A Regular Gland and Cylindrical with Flanged Ends:
1. Comply with MSS SP-78, Type II.
2. Class 125: CWP Rating: 200 psi.
3. Body: ASTM A48/A48M or ASTM A126, cast iron with lubrication sealing system.
4. Pattern: Regular or short.
5. Plug: Cast iron or bronze with sealant groove.

PART 3 EXECUTION

3.1 EXAMINATION

A Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.

B Verify valve parts to be fully operational in all positions from closed to fully open.

C Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.

D Should valve is determined to be defective, replace with new valve.

3.2 INSTALLATION

A Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

C Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.

D Install check valves where necessary to maintain direction of flow as follows:
1. Lift Check: Install with stem plumb and vertical.
2. Swing Check: Install horizontal maintaining hinge pin level.
3. Orient plate-type into horizontal or vertical position, between flanges.

E Provide chainwheels on operators for valves 4 inch and larger where located 96 inches or more above finished floor, terminating 60 inches above finished floor.

END OF SECTION

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SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A Prefabricated trapeze-framed systems.

B Strut systems for pipe or equipment support.

C Beam clamps.

D Pipe hangers.

E Pipe rollers and roller supports.

F Pipe supports, guides, shields, and saddles.

G Nonpenetrating rooftop supports for low-slope roofs.

H Anchors and fasteners.

1.2 REFERENCE STANDARDS

A ASME B31.9 - Building Services Piping.

B ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

C ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.

D ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

E ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping.

G ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

H ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

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

J ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

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

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

M ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

N ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements.

O ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry.

P ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements.

Q ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.

R MFMA-4 - Metal Framing Standards Publication.

S MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

T UL (DIR) - Online Certifications Directory.

U UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.3 SUBMITTALS

A Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

B Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.

C Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALITY ASSURANCE

A Comply with applicable building code.

1.5 DELIVERY, STORAGE, AND HANDLING

A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Spec applicable to plumbing systems and condensate systems shown on HVAC plans.

B Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.

C Provide hardware products listed, classified, and labeled as suitable for intended purpose.

D Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.

E Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

F Materials for Metal Fabricated Supports: Comply with Section 055000.
1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

G Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.
1. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
2. Outdoor, Damp, or Wet-Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

2.2 PREFABRICATED TRAPEZE-FRAMED SYSTEMS

A Prefabricated Trapeze-Framed Metal Strut Systems:
1. MFMA-4 compliant, pre-fabricated, MSS SP-58 Type 59 continuous-slot metal strut channel with associated tracks, fittings, and related accessories.
2. Strut Channel or Bracket Material:
   a. Indoor Dry Locations: Use zinc-plated steel or galvanized steel.
   b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
3. Accessories: Provide bracket covers, clamps, protectors, and vibration dampeners.

2.3 STRUT SYSTEMS FOR PIPE OR EQUIPMENT SUPPORT

A Strut Channels:
1. ASTM A653/A653M galvanized steel bracket with clamps for surface mounting of piping or plumbing equipment support.

2. Channel or Bracket Kits: Include rods, brackets, end-fixed fittings, covers, clips, and other related hardware required to complete sectional trapeze section for piping or other support.

B Channel Nuts:
1. Provide carbon steel channel nut with epoxy plated or zinc finish and long, regular, or short spring as indicated on drawings.

2.4 BEAM CLAMPS

A MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.

B Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

C Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.5 PIPE HANGERS

A For a given pipe run, use hangers of the same type and material.

B Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

C Band Hangers, Adjustable:
1. MSS SP-58 type 7 or 9, zinc-plated ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.

D Swivel Ring Hangers, Adjustable:
1. MSS SP-58 type 10, epoxy-painted, zinc-colored.
2. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

E Clevis Hangers, Adjustable:
1. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
2. Felt-Lined: MSS SP-58 type 1, zinc-plated, silicone-free carbon steel.
3. Light-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.
4. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

2.6 HANGER RODS:

A Threaded zinc-plated steel unless otherwise indicated.

B Minimum Size, Unless Otherwise Indicated or Required:
1. Equipment Supports: 1/2 inch diameter.
2. Piping up to 1 inch: 1/4 inch diameter.
3. Pipinglarger than 1 inch up to 4 inch: 3/8 inch diameter.
4. Trapeze Support for Multiple Pipes: 1/2 inch in diameter.

2.7 PIPE CLAMPS

A Riser Clamps:
1. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
2. MSS SP-58 type 1 or 8, carbon steel or steel with epoxy plated, plain, stainless steel, or zinc plated finish.
3. Copper Tube Pipe Clamp: MSS SP-58 type 8, epoxy plated copper.
4. UL (DIR) listed: Pipe sizes 1/2 to 8 inch.

B Strut Clamps:
1. Pipe Clamp: Two-piece rigid, universal, or outer diameter type, carbon steel with epoxy copper or zinc finish.

2.8 PIPE ROLLERS AND ROLLER SUPPORTS

A MSS SP-58 type 43 based on required load, nonconductive and corrosion resistant.

B Material: Zinc plated ASTM A36/A36M carbon steel or ASTM A47/A47M malleable iron.

2.9 PIPE SUPPORTS, GUIDES, SHIELDS, AND SADDLES

A Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.

B Stanchions:
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

C U-Bolts:
1. MSS SP-58 type 24, zinc-coated carbon steel u-bolt for pipe support or anchoring.

D Intermediate Anchors and Pipe Alignment Guides:
1. Pipe Sizes 6 inch and Smaller: Minimum clearance of 0.16 inch.
2. Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.

E Pipe Alignment Guides:
1. Pipe Sizes 8 inch and Smaller: Spider or sleeve type.
2. Pipe Sizes 10 inch and Larger: Roller type.

F Pipe Shields for Insulated Piping:
1. MSS SP-58 type 40, ASTM A1011/A1011M steel or ASTM A653/A653M carbon steel.
2. General Construction and Requirements:
   a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
   b. Shields Material: UV-resistant polypropylene with glass fill.
   c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
   d. Service Temperature: Minus 40 to 178 degrees F.

e. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.

G Pipe Supports:
1. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.
2. Liquid Temperatures Up to 122 degrees F:
   a. Overhead Support: MSS SP-58 types 1, 3 through 12 clamps.
   b. Support From Below: MSS SP-58 types 35 through 38.
3. Operating Temperatures from 122 to 446 degrees F:
   a. Overhead Support: MSS SP-58 type 1 or 3 through 12 clamps with appropriate saddle of MSS SP-58 type 40 for insulated pipe.
   b. Roller Chair: MSS SP-58 types 41 or 43 through 46 roller chair support with appropriate saddle of MSS SP-58 type 39 for insulated pipe.
   c. Sliding Support: MSS SP-58 types 35 through 38.

H Pipe Supports, Thermal Insulated:
1. Manufacturers:
   a. Buckaroos, Inc: www.buckaroos.com
   b. Or pre-approved equivalent.
2. General Requirements:
   a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
   b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
   c. Provide pipe supports for 1/2 to 30 inch iron pipes.
   d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by 360 degree, PVC jacketing.
3. PVC Jacket:
   a. Pipe insulation protection shields to be provided with ball bearing hinge and locking seam.
   b. Minimum Service Temperature: Minus 40 degrees F.
   c. Maximum Service Temperature: 180 degrees F.
   d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
   e. Minimum Thickness: 60 mil, 0.06 inch.

2.10 NONPENETRATING ROOFTOP SUPPORTS FOR LOW-SLOPE ROOFS

A Provide galvanized steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified. All materials shall be UV resistant.

B Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.

C Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.

D Mounting Height: Adjustable, with a minimum clearance of 6 inches under supported component to top of roofing.

E Operating temperature: -30°F to 150°F.

2.11 ANCHORS AND FASTENERS

A Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

B Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.

C Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.

D Steel: Use beam ceiling clamps, beam clamps, machine bolts, or welded threaded studs.

E Wood: Use wood screws.

F Plastic and lead anchors are not permitted.

G Powder-actuated fasteners are not permitted.

H Hammer-driven anchors and fasteners are not permitted.

I Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.

J Preset Concrete Inserts: Continuous metal strut channel and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
1. Channel Material: Use galvanized steel.
2. Manufacturer: Same as manufacturer of metal strut channel framing system.

PART 3 EXECUTION

3.1 EXAMINATION

A Verify that field measurements are as indicated.

B Verify that mounting surfaces are ready to receive support and attachment components.

C Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A Install products in accordance with manufacturer's instructions and ASME B31.9.

B Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.

C Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

D Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F Roof mounted piping and conduit:
1. Coordinate all roof mounted support locations and loads with roofing contractor.
2. Space supports per all applicable codes and as indicated.
3. Provide 6" minimum under pipe and conduit to allow for roof repair.

G Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

H Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

I Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

J Place hangers within 12 inches of each horizontal elbow.

K Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

L Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.

M Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

N Provide hangers adjacent to motor driven equipment with vibration isolation.

O Support cast iron drainage piping at every joint.

P Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Q Where trapeze hangers are constructed, the all-thread rods supporting the trapeze member shall not extend more than 1" below the assembly.

R Storm and Sanitary Sewer Piping 5" and over with hubless couplings or hub and spigot joints: In addition to hangers provide bracing and joint restraints to prevent horizontal movement and separation. This shall be done at every branch opening, connection or change of direction by the use of braces, blocks, rodding, or other suitable means to prevent movement. Refer to CISPI 301 and 310 for illustrative details of restraint systems.

S Plumbing Piping - Storm, Drain, Waste, and Vent:

1. Conform to ASME B31.9.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
6. Wall Support for Pipe Sizes 4 inch and Over: Welded steel bracket and wrought steel clamp.
7. Vertical Support: Steel riser clamp.
8. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
9. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

T Plumbing Piping - Water:

1. Conform to ASME B31.9.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
5. Hangers for Hot Pipe Sizes 6 inch and Larger: Adjustable steel yoke, cast iron pipe roll, double hanger.
6. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
7. Wall Support for Pipe Sizes Up to 3 inch: Cast iron hook.
8. Wall Support for Pipe Sizes 4 inch and Larger: Welded steel bracket and wrought steel clamp.
9. Wall Support for Hot Pipe Sizes 6 inch and Larger: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron pipe roll.
10. Vertical Support: Steel riser clamp.
11. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
12. Floor Support for Hot Pipe Sizes to 4 inch: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
13. Floor Support for Hot Pipe Sizes 6 inch and Larger: Adjustable cast iron pipe roll and stand, steel screws, and concrete pier or steel support.
14. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

U Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

1. Concrete Wedge Expansion Anchors: Comply with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Comply with ICC-ES AC01.
3. Concrete Screw Type Anchors: Comply with ICC-ES AC193.
4. Masonry Screw Type Anchors: Comply with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Comply with ICC-ES AC308.
6. Other Types: As required.

V Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
5. Any all-thread rod used to assemble or support metal channel (strut) shall be cut to not extend more than 1" past the channel.

W Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

X Secure fasteners according to manufacturer's recommended torque settings.

Y Remove temporary supports.

3.3 SCHEDULES

A Pipe Hanger Spacing:
1. Metal Piping:
   a. Pipe Size: 1/2 inch to 1-1/4 inch:
      1) Maximum Hanger Spacing: 6.5 ft.
      2) Hanger Rod Diameter: 3/8 inches.
   b. Pipe Size: 1-1/2 inch to 2 inch:
      1) Maximum Hanger Spacing: 10 ft.
      2) Hanger Rod Diameter: 3/8 inch.
   c. Pipe Size: 2-1/2 inch to 3 inch:
      1) Maximum Hanger Spacing: 10 ft.
      2) Hanger Rod Diameter: 1/2 inch.
   d. Pipe Size: 4 inch to 6 inch:
      1) Maximum Hanger Spacing: 10 ft.
      2) Hanger Rod Diameter: 5/8 inch.
2. Plastic Piping:
   a. All Sizes:
      1) Per manufacturer's requirements.
      2) Hanger Rod Diameter: 3/8 inch.

3.4 FIELD QUALITY CONTROL

A Inspect support and attachment components for damage and defects.

B Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 220553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A Nameplates.

B Tags.

C Pipe markers.

1.2 REFERENCE STANDARDS

A ASME A13.1 - Scheme for the Identification of Piping Systems.

B ASME A13.1 - Scheme for the Identification of Piping Systems.

C ASTM D709 - Standard Specification for Laminated Thermosetting Materials.

1.3 SUBMITTALS

A See Section 013000 - Administrative Requirements for submittal procedures.

B Schedules:
1. Submit plumbing component identification schedule listing equipment, piping, and valves.
2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
3. Valve Data Format: Include id-number, location, function, and model number.

C Product Data: Provide manufacturers catalog literature for each product required.

D Manufacturer's Installation Instructions: Indicate special procedures, and installation.

E Project Record Documents: Record actual locations of tagged valves.

PART 2 PRODUCTS

2.1 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

A Nameplates:
1. Heat exchangers, water heaters, and other heat transfer products.
2. Control panels, transducers, and other related control equipment products.
3. Pumps, tanks, filters, water treatment devices, and other plumbing equipment products.

B Tags:
1. Piping: 3/4 inch diameter and smaller.

2. Manual operated and automated control valves.

C Pipe Markers: 3/4 inch diameter and higher.

2.2 MANUFACTURERS

A Advanced Graphic Engraving: www.advancedgraphicengraving.com.

B Brady Corporation: www.bradycorp.com.

C Brimar Industries, Inc.: www.pipemarker.com.

D Champion America, Inc: www.Champion-America.com.

E Craftmark Pipe Markers: www.craftmarkid.com/#sle.

F Kolbi Pipe Marker Co: www.kolbipipemarkers.com.

G Marking Services, Inc.: www.markserv.com

H Seton Identification Products: www.seton.com/aec.

I Or pre-approved equivalent.

2.3 NAMEPLATES

A Description: Laminated piece with up to three lines of text.
1. Letter Color: White.
2. Letter Height: 1/4 inch.
3. Background Color: Black.
4. Nameplate Height: 1-1/2 inch.
5. Nameplate Material:
   a. Flexible: Vinyl with adhesive backing per ASTM D709.

2.4 TAGS

A Flexible: Vinyl with engraved black letters on light contrasting background color with up to three lines of text. Minimum tag size 1-1/2 inch in diameter.

B Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, blank, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.

C Valve Tag Schedule: In Valve and Equipment Schedule Binder

2.5 PIPE MARKERS

A Comply with ASME A13.1.

B Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of the fluid or system conveyed.

C Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.

D Underground Flexible Marker: Bright-colored continuously printed ribbon tape, minimum 6 inches wide by 4 mil, 0.004 inch thick, manufactured for direct burial service.

E Identification Scheme, ASME A13.1:
1. Primary: External Pipe Diameter, Uninsulated or Insulated.
   a. 3/4 to 1-1/4 inches: Use 8 inch field-length with 1/2 inch text height.
   b. 1-1/2 to 2 inches: Use 8 inch field-length with 3/4 inch text height.
   c. 2-1/2 to 6 inches: Use 12 inch field-length with 1-1/4 inch text height.
   d. 8 to 10 inches: Use 24 inch field-length with 2-1/2 inch text height.
   e. Over 10 inches: Use 32 inch field-length with 3-1/2 inch text height.
2. Secondary: Color scheme per fluid service.
   a. Domestic Cold Water: White text on green background.
   b. Domestic Hot Water: White text on green background.
   c. Domestic Hot Water Return: White text on green background.
   d. Storm: White text on green background.
   e. Overflow: White text on green background.
   f. Sanitary: White text on green background.
   g. Plumbing Vent: White text on green background.
   h. Natural Gas: Black text on yellow background.

PART 3 EXECUTION

3.1 PREPARATION

A Degrease and clean surfaces to receive identification products.

3.2 INSTALLATION

A Install tags in clear view and align with axis of piping

B Install plastic pipe markers in accordance with manufacturer's instructions.

C Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.

D Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

E Apply ASME A13.1 Pipe Marking Rules:
1. Identify service and flow direction.
2. Provide additional identification if the sysetm is medium or high pressure when multiple pressure zones are being provided for the same system in the building.

3. Place pipe marker adjacent to changes in direction.
4. Place pipe marker adjacent each valve port and flange end.
5. Place pipe marker at both sides of floor and wall penetrations.
6. Place pipe marker every 20 feet on straight runs including risers and drops.

3.3 TAGS

A Install tags with corrosion-resistant chain.

B Identify valves in main and branch piping with tags.

C Identify small devices such as in-line pumps with tags.

D Identify pipe 1 inch and smaller with tags.

3.4 PIPE MARKERS

A Install plastic pipe markers in accordance with manufacturer's instructions.

B Install plastic tape pipe markers complete/around pipe in accordance with manufacturer's instructions.

C Identify piping, concealed or exposed, with plastic pipe markers. Identify service, flow direction. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure and at each obstruction.

D All underground piping systems shall have a non-metallic warning tape, with appropriate warning, buried 24 inches above top of pipe.

3.5 NAME PLATES

A Install plastic name plates with adhesive backing.

3.6 VALVE AND EQUIPMENT SCHEDULE BINDER

A Provide 3-ring binder for all valve and equipment schedules with tabs and plastic page protectors for each system. Schedules to be on standard - size bond paper with following information:
   1. Valve Schedules:
      a. Valve number
      b. Piping system
      c. System abbreviation (as shown on valve tag)
      d. Location of valve (room or space)
      e. Area served
      f. Normal operating position (opened, closed, modulating)
      g. Indicate emergency shutoff or similar special uses.
   2. Equipment Schedules:
      a. Owners equipment label
      b. Location

c. All data from manufacturer's equipment label including Model No., Serial No., Electrical data, etc.
d. Pump water flow and pressure
e. Motor data and measured amps at balancing

3. As-Built Record Building Plans:
a. Indicate all valve and equipment locations
b. Provide in electronic format, .pdf or .dwg

3.7 ADJUSTING

A Relocate mechanical identification materials and devices that have become visually blocked by other work.

END OF SECTION

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SECTION 220719

PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A Flexible elastomeric cellular insulation.

B Glass fiber insulation.

C Jacketing and accessories.

1.2 REFERENCE STANDARDS

A ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

B ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.

C ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement.

D ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

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

F ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

1.3 SUBMITTALS

A Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

B Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.4 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section.

B Applicator Qualifications: Company specializing in performing the type of work specified in this section and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.6 FIELD CONDITIONS

A Maintain ambient conditions required by manufacturers of each product.

B Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

B Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

C Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

D Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

E Products shall be certified by UL GREENGUARD GOLD or Indoor Advantage Gold.

F Products shall certified to meet or exceed UL Standard 2818 -2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

G Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

2.2 GLASS FIBER INSULATION

A Manufacturers:
1. CertainTeed Corporation: www.certainteed.com/#sle.
2. Johns Manville Corporation: www.jm.com/#sle.
3. Knauf Insulation: www.knaufinsulation.com/#sle.
4. Or pre-approved equivalent.

B Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm.

C Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

D Vapor Barrier Lap Adhesive: Compatible with insulation.
1. Shall meet ASTM C916 Type I/II

E Insulating Cement/Mastic: ASTM C195; hydraulic setting on Glass wool.

F Fibrous Glass Fabric:
1. Cloth: Untreated; 9 oz/sq yd weight.
2. Blanket: 1.0 pcf density.
3. Weave: 5 by 5.

G Indoor Vapor Barrier Finish:
1. Cloth: Untreated; 9 oz/sq yd weight.
2. Vinyl emulsion type acrylic, compatible with insulation, white color.
3. Permeance shall be 0.07 perms or less at 45 mils dry tested by ASTM E96.

H Insulating Cement: ASTM C449.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A Manufacturers:
1. Aeroflex USA, Inc: www.aeroflexusa.com/#sle.
2. Armacell LLC: www.armacell.us/#sle.
3. K-Flex USA LLC: www.kflexusa.com/#sle.
4. Or pre-approved equivalent.

B Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
1. K Value: ASTM C177; 0.25 at 75 degrees F.
2. Minimum Service Temperature: Minus 40 degrees F.
3. Maximum Service Temperature: 220 degrees F.
4. Moisture Vapor Permeability: .03 perm inch, when tested in accordance with ASTM E96/E96M.
5. Connection: Waterproof vapor barrier adhesive.

C Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.4 JACKETING AND ACCESSORIES

A PVC Plastic Jacket:
1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
   a. Minimum Service Temperature: 0 degrees F.
   b. Maximum Service Temperature: 150 degrees F.
   c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
   d. Thickness: 10 mil, 0.010 inch.
   e. Connections: Brush on welding adhesive.
2. Covering Adhesive Mastic: Compatible with insulation.

2.5 ADA FIXTURE INSULATION

A Manufacturers:
1. Truebro, Inc.

2. Handi-Shield.
3. Or pre-approved equivalent.

B Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
1. All Pipe Sizes: Insulation shall be any of the following:
   a. Protective shield guards, comply with ANSI article 4.19.4 and CABO/ANSI 4.20.4, color shall be white.

PART 3 EXECUTION

3.1 EXAMINATION

A Verify that piping has been tested before applying insulation materials.

B Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A Install in accordance with manufacturer's instructions.

B Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C Exposed Piping: Locate insulation and cover seams in least visible locations.

D Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.

E Glass fiber insulated pipes conveying fluids below ambient temperature:
1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Coat all elbows, fittings, valves and flanges with vapor barrier mastic and reinforcing mesh. Finish with PVC fitting covers.

F For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

G Glass fiber insulated pipes conveying fluids above ambient temperature:
1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with PVC fitting covers.

H Inserts and Shields:
1. Application: Insulated piping 3/4 inches diameter or larger.

2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
3. Shield shall span an arc of 180 degrees.
4. Match diameter of shield to OD of insulation.
5. Shield dimensions shall not be less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
6. Insert Location: Between support shield and piping and under the finish jacket.
7. Thermal-Hanger Insert Shields: Install according to manufacturer's written instructions.

I Insulated Piping: Attach hangers and supports to piping as follows:
1. Piping Operating Above Ambient Temperature:
   a. Where piping is not supported on rollers or trapeze, hangers may project through insulation.
   b. For straight runs of piping, at points of support more than 100 feet from elbow or anchor point, use roller type supports.
   c. Where piping is supported on rollers or trapeze, support piping at outside diameter of insulation.
      1) NPS Smaller than 2: Provide MSS SP-58, Type 40, protective shield.
      2) NPS 2 1/2 and Larger: Provide thermal-hanger shield insert and weight-distribution plate.
2. Piping Operating Below Ambient Temperature: Support piping at outside diameter of insulation. Do not penetrate vapor barrier.
   a. NPS Smaller than 2: Provide MSS SP-58, Type 40, protective shield.
   b. NPS 2 1/2 and Larger: Provide thermal-hanger shield insert and weight-distribution plate.

J Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 078400.

3.3 INSULATION AND JACKET SCHEDULE

A Insulation thickness listed below is based on the thermal conductivity performance of the material listed.
1. Provide insulation thickness based on 2012 International Energy Conservation Code minimum requirements.
2. Alternative material thickness must be adjusted as required to provide equivalent conductivity performance.
3. Alternative material subtitution shall be reviewed by the Architect.

B Indoor Piping:
1. Domestic Cold Water:
   a. All Pipe Sizes:
      1) Glass-Fiber Pipe Insulation, Type I: 1 inch thick.
2. Domestic Hot and Recirculated Hot Water:
   a. 1-1/4-Inch and Smaller:
      1) Glass-Fiber Pipe Insulation, Type I: 1 inch thick.
   b. 1-1/2-Inch and Larger:

1) Glass-Fiber Pipe Insulation, Type I: 1-1/2 inches thick.

3. Domestic Cold, Hot, and Hot Recirculating Water Buried in Masonry Walls:
   a. Flexible elastomeric, 1/2 inch thick.
4. Domestic Cold, Hot, and Hot Recirculating Water Buried Under Floor Slab:
   a. Flexible elastomeric, 1/2 inch thick.
5. Plumbing Vents to 24 Inches Below Roof:
   a. All Pipe Sizes:
      1) Glass-Fiber Pipe Insulation, Type I: 1/2 inch thick.
6. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
   a. All Pipe Sizes:
      1) Protective shield guards, comply with ANSI article 4.19.4 and CABO/ANSI 4.20.4, color shall be white.
7. Condensate and Equipment Drain Water Below 60 Degrees F:
   a. All Pipe Sizes:
      1) Glass-Fiber, Preformed Pipe, Type I: 1/2 inch thick.
8. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Degrees F, including roof receptors serving mechanical equipment:
   a. All Pipe Sizes:
      1) Glass-Fiber Pipe Insulation, Type I: 1/2 inch thick.

C Indoor, Field Applied Jacket:
1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
2. If more than one material is listed, selection from materials is Contractor's option.
3. Piping, Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor):
   a. PVC: 20 mils thick.

END OF SECTION

SECTION 221005

PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A Sanitary waste piping, buried within 5 feet of building.

B Sanitary waste and vent piping, above grade.

C Special fittings - Sanitary waste and vent.

D Equipment drains and overflows.

E Domestic water piping, buried within 5 feet of building.

F Domestic water piping, above grade.

G Natural gas piping, valves and specialties, above grade.

H Pipe flanges, unions, and couplings.

I Joining materials.

1.2 DEFINITIONS

A ABS: Acrylonitrile-butadiene-styrene plastic.

B CPVC: Chlorinated polyvinyl chloride plastic.

C CR: Chlorosulfonated polyethylene synthetic rubber.

D EPDM: Ethylene-propylene-diene terpolymer rubber.

E Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤0.25% per Safe Drinking Water Act as amended January 4th 2011 Section1417.

F NBR: Acrylonitrile-butadiene rubber.

G PE: Polyethylene plastic.

H PP: Polypropylene plastic.

I PVC: Polyvinyl chloride plastic.

1.3 REFERENCE STANDARDS

A ANSI LC 1/CSA 6.26 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing.

B ANSI Z21.18/CSA 6.3 - Gas Appliance Pressure Regulators.

C ANSI Z21.80/CSA 6.22 - Line Pressure Regulators.

D ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300.

E ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

F ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings.

G ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes.

H ASME B16.51 - Copper and Copper Alloy Press-Connect Pressure Fittings.

I ASME B31.1 - Power Piping.

J ASME B31.2 - Fuel Gas Piping; The American Society of Mechanical Engineers; 1968.

K ASME B31.9 - Building Services Piping.

L ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators.

M ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings.

N ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

O ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings.

P ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

Q ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

R ASTM A888 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for sanitary and storm drain, waste, and vent piping applications; 2009

S ASTM B32 - Standard Specification for Solder Metal.

T ASTM B68/B68M - Standard Specification for Seamless Copper Tube, Bright Annealed.

U ASTM B68M - Standard Specification for Seamless Copper Tube, Bright Annealed (Metric); 2011.

V ASTM B75/B75M - Standard Specification for Seamless Copper Tube.

W ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service.

X ASTM B813 - Standard Specification for Water Flushable Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube.

Y ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

Z ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.

AA ASTM C1540 - Standard Specification for Heavy-Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings.

BB ASTM D2235 - Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings.

CC ASTM D2513 - Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings.

DD ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

EE ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.

FF ASTM D2846/D2846M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot- and Cold-Water Distribution Systems.

GG ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.

HH ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

II ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.

JJ ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

KK ASTM F441/F441M - Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.

LL ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

MM ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers; 1992 (Reapproved 2008).

NN ASTM F3226/F3226M - Standard Specification for Metallic Press-Connect Fittings for Piping and Tubing Systems.

OO AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

PP AWWA C606 - Grooved and Shouldered Joints.

QQ AWWA C651 - Disinfecting Water Mains.

RR CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications.

SS FM 1680 - Approval Standard for Couplings Used in Hubless Cast Iron Systems for Drain, Waste or Vent, Sewer, Rainwater or Storm Drain Systems Above and Below Ground, Industrial/ Commercial and Residential.

TT IAPMO (UPC) - Uniform Plumbing Code.

UU IAPMO/ANSI/CAN Z1117 - Standard for Press Connections.

VV ICC (IPC) - International Plumbing Code.

WW MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.

XX NSF 61 - Drinking Water System Components - Health Effects.

YY NSF 372 - Drinking Water System Components - Lead Content.

ZZ NSF/ANSI 14 - Plastics Piping System Components and Related Materials;

AAA NSF/ANSI 372 - Drinking Water System Components – Lead Content

1.4 SUBMITTALS

A Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

B Project Record Documents: Record actual locations of valves.

C Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Valve Repacking Kits: One for each type and size of valve.

1.5 QUALITY ASSURANCE

A Perform work in accordance with applicable codes and standards.

B Valves: Manufacturer's name and pressure rating marked on valve body.

C Lead Free: Refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content =0.25% per Safe Drinking Water Act as amended January 4th 2011 Section 1417.

D Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.

E Welder Qualifications: Certified in accordance with ASME BPVC-IX.

F Identify pipe with marking including manufacturer's registered trademark, country of origin, date of manufacture, size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

G Hub and Spigot Cast Iron pipe and fittings shall be manufactured from gray cast iron and shall conform to ASTM A 74. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International.

H Hubless Cast Iron pipe and fittings conform to ASTM A 888 or CISPI Standard 301. All pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute ® and listed by NSF® International.

I Hubless Couplings shall be listed by NSF® International and conform to ASTM C 1540 for super duty or heavy duty couplings where indicated. Gaskets shall conform to ASTM C 564.

1.6 REGULATORY REQUIREMENTS

A Conform to applicable code for installation of backflow prevention devices.

B Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

1.7 DELIVERY, STORAGE, AND HANDLING

A Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B Provide temporary protective coating on cast iron and steel valves.

C Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 FIELD CONDITIONS

A Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Potable Water Supply Systems: Provide piping, pipe fittings, solder, and flux (if used), complying with NSF 61 and NSF 372; label pipe and fittings.

2.2 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING

A Cast Iron Pipe: ASTM A74 extra heavy weight.
1. Fittings: Cast iron.
2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets.

B Cast Iron Pipe: ASTM A 888 or CISPI 301, hubless.
1. Fittings: Cast iron.
2. Joints: ASTM C 1540 heavy duty stainless steel clamp-and-shield assemblies with ASTM C 564 neoprene gaskets.

C Solid Wall PVC Pipe: ASTM D 2665, Schedule 40 or ASTM D 3034, SDR-35.
1. Fittings: PVC, socket type, ASTM D2665, made to ASTM D 3311, drain, waste, and vent patterns.
2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.3 SANITARY WASTE AND VENT PIPING PIPING, ABOVE GRADE

A Cast Iron Pipe: CISPI 301, hubless, service weight.
1. Fittings: Cast iron.
2. Joints: ASTM C 1540 heavy duty stainless steel clamp-and-shield assemblies with ASTM C 564 neoprene gaskets.

2.4 SPECIAL FITTINGS - SANITARY WASTE AND VENT

A Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
1. Sleeve Materials:
   a. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
   b. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
   c. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

B Expansion Joints: Two or three-piece, ductile-iron assembly consisting of telescoping sleeve(s) with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

C Wall-Penetration Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

2.5 EQUIPMENT DRAINS AND OVERFLOWS

A Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn; using one of the following joint types:
1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
3. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, non toxic synthetic rubber sealing elements..

2.6 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

2.7 DOMESTIC WATER PIPING, ABOVE GRADE

A Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
2. Joints: ASTM B32 solder.
3. Joints: Grooved mechanical couplings.
4. Mechanical Press Sealed Fittings: ASME B16.51 or IAPMO/ANSI/CAN Z1117, ICC (IPC), and IAPMO (UPC) approved, NSF 61 and NSF 372 certified, with EPDM seals.
    a. Manufacturers:
        1) Anvil International: www.anvilintl.com/#sle.
        2) Apollo Valves: www.apollovalves.com/#sle.
        3) FNW; Copper Press: www.fnw.com/#sle.
        4) Mueller Streamline, Co; PRS: www.muellerstreamline.com/#sle.
        5) NIBCO INC; Press System: www.nibco.com/#sle.
        6) Viega LLC: www.viega.com.
        7) Merit Brass Company: www.meritbrass.com.
        8) Or pre-approved equivalent.

B Stainless Steel Pipe: ASTM A269/A269M or A312, Grade TP304 alloy, Schedule 10 for up to 150 psi.
1. Mechanical Press Sealed Fittings: ASTM F3226/F3226M, ICC (IPC), and IAPMO (UPC) approved, NSF 61 and NSF 372 certified, with EPDM seals.
2. Fittings: Fittings may be roll grooved stainless steel compatible with piping and couplings.
3. Rigid Mechanical Couplings for Grooved Joints:
    a. Housing Material: Grade TP316 stainless steel or enamel coated ductile iron.
    b. Gasket Material: EPDM suitable for operating temperature range from minus 30°F (minus 34°C) to 230°F (110°C) or Grade "P" fluoroelastomer blend suitable for operating temperature range from 0°F (-18°C) to 180°F (82°C).
    c. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel.
    d. Manufacturers:
        1) Apollo Valves: www.apollovalves.com/#sle.
        2) Viega LLC: www.viega.com.

2.8 NATURAL GAS PIPING, VALVES AND SPECIALTIES, ABOVE GRADE

A Protective Coating:

1. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in contact with materials that may corrode the pipe.

B Steel Pipe: ASTM A53/A53M Schedule 40 black.
1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
2. Joints: Threaded or welded to ASME B31.1.
3. Mechanical Press Sealed Fittings: Double pressed type and approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.

C Corrugated, Stainless-Steel Tubing Systems (CSST):
1. Standard: Comply with ANSI LC 1/CSA 6.26, UL723 (ASTM E84), ICC LC 1024, ANSIZ223.1.
2. Listings: CSA, ICC PMG1058, UL(Through Penetration Firestop System), FM, IAPMO ES ER-0227.
3. Tubing: Corrugated stainless steel with plastic jacket or coating.
4. Jacketing: Extruded fire-retarded engineered polymer designed to enhance the energy dissipating properties of the flexible gas piping. Conductive jacket shall conform to ASTM E-84 flame spread rating not to exceed 25 and ASTM-E84 smoke density rating shall not exceed 50, and shall be resistant to UV.
5. Fittings: Copper alloy with ends made to fit corrugated tubing. Include ends with threads according to ASME B1.20.1 if connection to threaded pipe or fittings is required. Made of yellow brass and be tested and listed with CSA International for concealed use. Joints shall be a metal-to-metal flare seal with no gaskets and made with a stainless steel insert to pilot the tubing ID onto the fitting. Provided by piping system manufacturer.
6. Provide piping with integral lightning protection.
7. Manifolds: Malleable iron or steel with protective coating. Include threaded connections according to ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
8. Striker Plates: Steel, designed to protect tubing from penetrations.
9. Manufacturers:
   a. Omega Flex, Inc; TracPipe CounterStrike: www.omegaflex.com/#sle.
   b. Gastite / FlashShield.
   c. Ward.
   d. Or pre-approved equivalent.

D Gas Valves and Specialties:
1. Flexible Connectors: ANSI Z21.24, copper alloy.
2. Quick-Disconnect Devices: ANSI Z21.41, convenience outlets and matching plug connector.
3. Appliance Connector Valves: ANSI Z21.15 and CSA International listed.
4. Automatic Gas Valves: ANSI Z21.21, with electrical or mechanical operator for actuation by appliance automatic shutoff device.
5. Gas Stop/Cocks: Bronze body with AGA stamp, plug type with bronze plug and flat or square head, ball type with chrome-plated brass ball and lever handle, or butterfly valve with stainless-steel disc and fluorocarbon elastomer seal and lever handle; 2-psig minimum pressure rating.
6. Gas Valves, NPS 2 and Smaller: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating.
   a. Tamperproof Feature: Include design for locking.
7. Plug Valves, NPS 2-1/2 and Larger: ASME B16.38 and MSS SP-78 cast-iron, lubricated plug valves, with 125-psig pressure rating.

a. Tamperproof Feature: Include design for locking.

8. Electrically Operated Gas Valves: UL 429, bronze, aluminum, or cast-iron body solenoid valve; 120-V ac, 60 Hz, Class B, continuous-duty molded coil. Include NEMA ISC 6, Type 4, coil enclosure and electrically opened and closed dual coils. Valve position shall normally be closed.
9. Line Pressure Regulators and Appliance Regulators Indicators:
   a. Compliance Requirements:
      1) Appliance Regulator: ANSI Z21.18/CSA 6.3.
      2) Line Pressure Regulator: ANSI Z21.80/CSA 6.22.
   b. Materials in Contact With Gas:
      1) Housing: Aluminum, steel (free of non-ferrous metals).
      2) Seals and Diaphragms: NBR-based rubber.
   c. Maximum Inlet Operating Pressure: 10 psi.
      1) Appliance Regulator: 10 psi.
      2) Line Pressure Regulator: 10 psi.
   d. Maximum Body Pressure: 10 psi.
   e. Output Pressure Range: 1 inch wc to 80 inch wc.
10. Pressure Regulators: Single stage and suitable for fuel gas service. Steel jacket and corrosion-resistant components, elevation compensator, and atmospheric vent.
   a. NPS 2 and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
   b. NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel flanges and according to ASME B16.24 for copper and copper-alloy flanges.
   c. Service Pressure Regulators: ANSI Z21.80. Include 100-psig minimum inlet pressure rating.
   d. Appliance Pressure Regulators: ANSI Z21.18. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
   e. Pressure Regulator Vents: Factory- or field-installed, corrosion-resistant screen in opening if not connected to vent piping.
11. Service Meters:
   a. Gas service and meter will be furnished and set by gas utility company.

2.9 PIPE FLANGES, UNIONS, AND COUPLINGS

A Unions for Pipe Sizes 3 inch and Under:
1. Ferrous Pipe: Class 150 malleable iron threaded unions.
2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B Flanges for Pipe Sizes Over 1 inch:
1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
2. Copper Tube and Pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
3. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
4. Flanged, Ductile-Iron Pipe Gasket, Bolts, and Nuts: AWWA C110, rubber gasket, carbon-steel bolts and nuts.
5. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
6. Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
   a. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness, unless thickness or specific material is indicated.

1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

b. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C Couplings: Iron-body sleeve assembly, fabricated to match OD of plain-end, pressure pipes.
1. Sleeve: ASTM A 126, Class B, gray iron.
2. Followers: ASTM A 47 malleable iron or ASTM A 536 ductile iron.
3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

D Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
1. Couplings shall be two-piece, housing cast with offsetting angle-pattern bolt pads.
2. Installation-Ready, for direct stab installation without field disassembly or loose parts.
3. Designed to permit some angular deflection, contraction, and expansion.
4. Couplings to be bolt pad to bolt pad assembly.
5. Coupling manufacturer’s factory-trained representative shall provide on-site training for the contractor’s field personnel in the proper use of grooving tools and installation of grooved joint products. The representative shall periodically visit the job site to ensure best practices in grooved joint installations are being followed.
6. Dimensions and Testing: In accordance with AWWA C606.
7. Housing Material: Provide ASTM A47/A47M malleable iron or ductile iron, galvanized.
8. Gasket Material: Prelubricated, grade EHP, EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
9. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel, ASTM A449.
10. When pipe is field grooved, provide coupling manufacturer's grooving tools.
11. Manufacturers:
    a. Anvil International: www.anvilintl.com/#sle.
    b. Apollo Valves: www.apollovalves.com/#sle.
    c. Victaulic Company: www.victaulic.com.
    d. Or pre-approved equivalent.
12. Grooved Copper Tube Fittings:
    a. Fittings: ASME B16.22 wrought copper and ASTM B 75 (ASTM B 75M), copper tube or ASME B 16.18 and ASTM B 584, bronze casting.
    b. Couplings: Rigid pattern, offsetting angle-pattern bolt pads.
13. Grooved Steel Pipe and Fittings:
    a. Fittings: ASTM A 536, Grade 65-45-12 ductile iron;-ASTM A 53/A 53M, Type F, E, or S, Grade B factory-fabricated steel; or ASTM A 234, Grade WPB steel fittings with grooves or shoulders constructed to accept grooved-end couplings.
    b. Rigid Type Couplings: Housings shall be cast with offsetting angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with ANSI B3 1.1 and B31.9.
    c. Flexible Type Couplings: Used in locations where vibration attenuation and stress relief are required. Use three flexible couplings in lieu of a flexible connector.
14. Grooved PVC/CPVC Pipe and Fittings:

a. Fittings: Schedule 80 molded, ASTM A 536, Grade 65-45-12 ductile iron.
b. Rigid Type Couplings: Housings shall be cast with offsetting angle-pattern bolt pads to provide rigidity and system support and hanging in accordance with ANSI B3 1.1 and B31.9.
c. Flexible Type Couplings: Used in locations where vibration attenuation and stress relief are required. Use three flexible couplings in lieu of a flexible connector.

15. Piping 14-Inches and Larger: Couplings, consisting of two ductile iron housings with lead-in chamfer on the housing key, a wide-width flush seal gasket, and ASTM A449 zinc-electroplated steel bolts and nuts.

E No-Hub (Hubless) Couplings:

F Shielded, Heavy Duty No-Hub Couplings:
1. Testing: In accordance with ASTM C1540 and FM 1680.
2. Gasket Material: Neoprene complying with ASTM C564.
3. Band Material: Stainless steel.
4. Eyelet Material: Stainless steel.

G Pressed Fittings:
1. Stainless Steel Pipe:
   a. Stainless steel fitting shall conform to material and sizing requirements of ASTM A312 or ASTM A554.
   b. Fittings must be NSF 61 and/or NSF 372 approved or certified when used for domestic water applications.
   c. Sealing elements shall be EPDM or FKM, depending on application. Sealing elements shall be factory installed by the fitting manufacturer and include a feature that allows for leakage before the joint is pressed.
2. Copper Tube:
   a. Copper and copper alloy press fitting shall conform to material requirements of ASME B16.51 or IAPMO PS 117.
   b. Fittings must be NSF 61 and/or NSF 372 approved or certified when used for domestic water applications.
   c. Sealing elements shall be EPDM. Sealing elements shall be factory installed by the fitting manufacturer and include a feature that allows for leakage before the joint is pressed.

H Dielectric Connections: Waterway fitting with water impervious isolation barrier and one galvanized or plated steel end and one copper tube end, end types to match pipe joint types used.
1. Dielectric unions shall not be used.
2. Description: Combination of copper alloy and ferrous; threaded, solder, plain, and weld-neck end types and matching piping system materials.
3. Insulating Material: Suitable for system fluid, pressure, and temperature.
4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
   a. Dielectric-Flange Insulation Kits: Field-assembled, companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
5. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 degrees F.

6. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 degrees F.

2.10 JOINING MATERIALS

A Solder Filler Metals: ASTM B32, lead-free alloys. Include water-flushable flux according to ASTM B813.

B Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

C Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

D Solvent Cements: Manufacturer's standard solvent cements for the following:
1. ABS Piping: ASTM D 2235.
2. CPVC Piping: ASTM F 493.
3. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
4. PVC to ABS Piping Transition: ASTM D 3138.

E Plastic Pipe Seals: ASTM F 477, elastomeric gasket.

PART 3 EXECUTION

3.1 EXAMINATION

A Verify that excavations are to required grade, dry, and not over-excavated.

3.2 PREPARATION

A Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B Remove scale and dirt, on inside and outside, before assembly.

C Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

A Install in accordance with manufacturer's instructions.

B Provide non-conducting dielectric connections wherever joining dissimilar metals.
1. Dielectric unions are not allowed.

C Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D Install piping to maintain headroom, conserve space, and not interfere with use of space.

E Group piping whenever practical at common elevations.

F Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H Provide access where valves and fittings are not exposed.

I Establish elevations of buried piping outside the building to ensure not less than 4 ft of cover.

J Install vent piping penetrating roofed areas to maintain integrity of roof assembly.

K Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.

L Provide support for utility meters in accordance with requirements of utility companies.

M Install Y-pattern strainers for water on supply side of each control valve, water pressure reducing valve, solenoid valve, and pump. Provide NPS 3/4 nipple and ball valve with hose end and brass cap and chain in blowdown connection of strainers NPS 2 and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2.

N Install bell and spigot pipe with bell end upstream.

O Install valves with stems upright or horizontal, not inverted.

P Install water piping to ASME B31.9.

Q Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

R Mechanical Press Sealed Fittings: Press connections shall be made in accordance with the manufacturer’s installation instructions.On-site training shall be performed by the manufacturer. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.

S PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

T Install cast iron pipe in accordance with the “Cast Iron Soil Pipe Handbook” latest edition, as published by the Cast Iron Soil Pipe Institute.

U Any interior natural gas pressure regulators shall be vented to the exterior of the building per NFPA 54 / ANSI Z223.1.

V Install plastic pipe below grade in accordance with ASTM D2321. This includes providing the specific trench width required for each pipe size, the specific embedment material required for backfill, and the required compaction for supporting the piping and resisting pipe deformation.

W Sleeve pipes passing through partitions, walls, and floors.

X Mechanically formed tees in copper pipe may be formed per ANSI A40 by workers certified after factory authorized training. Branch lines shall be formed with two dimple/depth stops in line with the run of the tube.
1. Fabricate mechanically formed tees/outlets according to manufacturer's standard written procedure.
2. Mechanically formed outlets shall have a collar with a height not less than three times the thickness of the branch tube wall.
3. The branch shall be notched to conform to the inner curve of the run and shall be dimpled or otherwise impeded from penetrating the run pipe/tube to a depth that would obstruct the flow of fluid through the run pipe/tube.
4. The branch tube shall also be dimpled or otherwise marked to indicate the location of the notches with respect to the run.
5. Such marking shall be at a sufficient distance from the face of the joint to allow for a visual point of inspection after the joint is brazed.
6. All joints constructed using this method shall be brazed.

Y Grooved Joints:
1. Install in accordance with the manufacturer's latest published installation instructions.
2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.
3. Grooving tools shall be manufactured and supplied by the manufacturer of the couplings. Use roll sets or cut groovers compatible with the pipe material and wall thickness per manufacturer's installation instructions.
4. Factory trained representative shall provide on-site training for contractor’s field personnel in the use of grooving tools, application of groove, and product installation. The representative shall periodically visit the job site and review installation. Contractor shall remove and replace any improperly installed products.
5. Flexible type couplings can be used in locations where vibration attenuation and stress relief are required. Use three flexible couplings in lieu of a flexible connector.

Z Conceal all pipe in interior walls, piping chases, utility spaces, above ceilings or below grade or floors unless indicated to be exposed to view.
1. Do not install domestic water piping in exterior walls.
2. Piping chases located on exterior walls shall be ventilated, by openings, to interior spaces.

AA Piping shall be installed so as to allow for maintenance and removal of ceiling mounted equipment, heat pump, terminal units, etc..
1. Verify and coordinate exact equipment locations and service requirements with Installing Contractor.

BB Provide cleanouts in sanitary and storm sysetms as required by code at each change of direction greater than 45 degrees at minimum intervals of 50 feet for piping 4 inches and smaller and 100 feet for larger piping at base of each vertical soil or waste stack 18 inches above finished floor elevation.

CC Provide double grade cleanouts on sanitary lines leaving the building. Locate cleanouts within the first 5 lineal feet from the building. Provide 4-inch concrete slab at each cleanout, minimum 18 inches by 18 inches, with top flush with grade.

DD Provide drainage and vent piping runouts to plumbing fixtures and drains with trap of required size.

EE Vent terminals (VTRs) shall penetrate roof a minimum of 6 feet from any fire wall.

FF PVC piping shall not be installed in return air plenums.

GG Install expansion joints on vertical risers as indicated and required by codes.

HH Install wall cleanout covers for concealed piping types as indicated and required by codes.

II Install flashing flange and clamping device at each stack or vent passing through waterproof membranes.

JJ Install vent flashing sleeves and stacks passing through roof. Secure over stack flashing in accordance with roofing manufacturer's requirements.

KK Vent stacks shall terminate in accordance with applicable plumbing code or as follows:
1. At least 10 feet horizontally or 2 feet above doors, windows or other ventilating openings of the building or adjacent building.
2. No closer than 2 feet under any roof gable.
3. No closer than 2 feet from any wall extending above flat roof building.
4. No closer than 6 feet from any fire wall.
5. Minimum 7 feet above if roof is used for other purpose than weather protection (occupied).

LL Provide sway bracing on no-hub piping as required by code.

MM When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.4 EQUIPMENT DRAINS AND OVERFLOW

A Piping material shall be suitable for type and temperature of drainage and location of equipment. Size piping per manufacturer's requirements and as indicated.

B Cooling coil condensate drainage shall be copper pipe. Condensate drain piping size (unless indicated otherwise):
1. Air Handling Units and Rooftop Units:
   a. Less than 30 tons: 1 1/4"
   b. 31 - 50 tons: 1 1/2"
   c. 51 - 150 tons: 2"
   d. 151 - 300 tons: 3"
   e. 301 - 430 tons: 4"
2. Terminal Cooling, Fan Coil, Blower Coil and Furnaces:

a. 0 - 5 tons: 3/4"
b. 6 - 20 tons: 1"

C Route drains and overflows to nearest floor drain unless shown otherwise. Slope piping to drain at 1/8 inch per foot.

3.5 CONNECTIONS TO EQUIPMENT AND FIXTURES

A Piping installation requirements are specified in other sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B Extend piping and connect fixtures with water supplies, stops, risers, with traps, soil, waste, and vent piping as required by code and as indicated. Use size fittings required to match fixtures.

3.6 APPLICATION

A Install unions downstream of valves and at equipment or apparatus connections.

B Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.

C Install gate, ball, or butterfly valves for shut-off and to isolate equipment, part of systems, or vertical risers.

D Install globe valves for throttling, bypass, or manual flow control services.

E Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.

F Provide spring-loaded check valves on discharge of water pumps.

G Provide balancing valves in water recirculating systems where indicated.

H Provide automatic cold water fill assembly on each separate hydronic system unless hydronic system contains an automatic glycol feed system.

I Sump pump discharge piping shall be galvanized steel with ductile iron grooved fittings and couplings. Hubless connections are not allowed. This includes the pressurized piping from the pump to the connection discharging into the top of the horizontal gravity main.

3.7 MECHANICAL GROOVED COUPLING REQUIREMENTS

A Grooving tools shall be manufactured and supplied by the manufacturer of the couplings. Use roll sets or cut groovers compatible with the pipe material and wall thickness per manufacturer's installation instructions.

B Factory trained representative shall provide on-site training for contractor’s field personnel in the use of grooving tools, application of groove, and product installation. The representative shall periodically visit the job site and review installation. Contractor shall remove and replace any improperly installed products.

3.8 TOLERANCES

A Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated on the plans (if applicable) and slope to drain at minimum of 1/8 inch per foot slope.

B Kitchen Grease Waste Piping: Establish invert elevations within 1/2 inch vertically of loaction indicated on the plans (if applicable) and slope to drain at minimum of 1/4 inch per foot slope.

C Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.9 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A Prior to starting work, verify system is complete, flushed, and clean.

B Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.

D Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E Maintain disinfectant in system for 24 hours.

F If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.10 SERVICE CONNECTIONS

A Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve.
1. Provide sleeve in wall for service main and support at wall with reinforced concrete bridge. Calk enlarged sleeve and make watertight with pliable material. Anchor service main inside to concrete wall.
2. Water meter to be provided by water utility company. Contractor to rough in and install.
3. Provide 18 gauge, 0.0478-inch galvanized sheet metal sleeve around service main to 6 inch above floor and 6 feet minimum below grade. Size for minimum of 2 inches of loose batt insulation stuffing.

C Gas service, meter, and pressure regulator will be furnished by gas utility company. Connect new system to regulator outlet.

3.11 FIELD QUALITY CONTROL

A Test and balance all flow control, reducing, regulating, temperaturecontrol and relief valves for required flow and pressures per manufacturer's requirements. Submit documented and witnessed test and balance results for review.

B Drainage Piping:
1. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
   a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
   b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
2. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
3. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
4. Test gravity drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
   a. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
   b. Leave new, altered, extended, or replaced pressurized drainage piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   c. Test Procedure: Test gravity drainage piping (except outside leaders) on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
   d. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
   e. Prepare reports for tests and required corrective action.

C Domestic Water Piping:
1. Inspect domestic water piping as follows:
   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
   c. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
   d. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
   e. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
   f. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
2. Test domestic water piping as follows:

a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
d. Test Procedure: Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for 4 hours. Leaks and loss in test pressure constitute defects that must be repaired.
e. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
f. Prepare reports for tests and required corrective action.

D Natural Gas Piping:
1. Inspect natural gas piping as follows:
a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
b. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
c. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
d. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
e. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
f. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
2. Test natural gas piping as follows:
a. Test, inspect, and purge piping according to NFPA 54 and requirements of authorities having jurisdiction.
b. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.
c. Verify capacities and pressure ratings of service meters, pressure regulators, valves, and specialties.
d. Verify correct pressure settings for pressure regulators.
e. Verify that specified piping tests are complete.

3.12 CLEANING

A Clean interior of piping. Remove dirt and debris as work progresses.

B Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

END OF SECTION

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SECTION 221119

DOMESTIC WATER PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A Backflow preventers.

B Vacuum breakers.

C Mixing valves.

D Balancing valves.

E Outlet boxes.

F Hydrants.

G Water-hammer arrestors.

H Relief valves.

I Air vents.

1.2 ABBREVIATIONS AND ACRONYMS

A DZR: Dezincification resistant.

1.3 REFERENCE STANDARDS

A ASSE 1001 - Performance Requirements for Atmospheric Type Vacuum Breakers.

B ASSE 1010 - Performance Requirements for Water Hammer Arresters.

C ASSE 1011 - Performance Requirements for Hose Connection Vacuum Breakers.

D ASSE 1015 - Performance Requirements for Double Check Backflow Prevention Assemblies.

E ASSE 1020 - Performance Requirements for Pressure Vacuum Breaker Assemblies.

F ASSE 1052 - Performance Requirements for Hose Connection Backflow Preventers.

G ASSE 1056 - Performance Requirements for Spill Resistant Vacuum Breaker Assemblies.

H AWWA C510 - Double Check-Valve Backflow Prevention Assembly.

I AWWA C550 - Protective Interior Coatings for Valves and Hydrants.

J NSF 61 - Drinking Water System Components - Health Effects.

K NSF 372 - Drinking Water System Components - Lead Content.

L PDI-WH 201 - Water Hammer Arresters.

1.4 SUBMITTALS

A Product Data: Provide manufacturer's literature and data sheets for each product. Include information on materials of fabrication, assembly of components, dimensions, ratings, finishes, rough-in requirements, and installed accessories.

B Manufacturer's Instructions: Provide for products listed below. Include instructions for handling, protection, examination, preparation, and installation.

C Operation and Maintenance Data: Provide for products listed below.

1.5 REGULATORY REQUIREMENTS

A Conform to applicable code for installation of backflow prevention devices.

B Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.v

1.6 DELIVERY, STORAGE, AND HANDLING

A See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.

B Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

C Keep products in original manufacturer's packaging and protect from damage until ready for installation.

D Store products under cover and protected from weather and dirt. Elevate above grade.

E Protect end connections, flanges, threads, and grooves from dirt and damage.

F Protect product interiors against rust and corrosion.

G Do not use operating handles or stems as lifting or rigging points.

H Handle large products using slings.

1.7 WARRANTY

A See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Specialties in Potable Water Supply Systems: Provide products complying with NSF 61 and NSF 372.

B Source Limitations: Furnish domestic water piping specialties of same kind by same manufacturer.

C Provide brass-bodied domestic water piping specialties in DZR brass.

2.2 BACKFLOW PREVENTERS

A Double-Check Valve Backflow Preventers:
1. NPS 2 and Smaller:
   a. Assembly: ASSE 1015 and AWWA C510 with corrosion resistant internal parts and stainless steel springs; two independently operating check valves.
   b. Check Valves: Manufactured from bronze, copper silicon alloy, or stainless steel.
   c. Isolation Valves: Ball valves on inlet and outlet.
   d. End Connections: Threaded.
   e. Operation: Continuous-pressure applications.
   f. Maximum Working Pressure: 175 psi.
   g. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
   h. Working Temperature Range: 33 to 180 degrees F.
   i. Configuration: Designed for horizontal, vertical, or N-pattern flow.
   j. Accessories:
      1) Test cocks.
2. NPS 2-1/2 and Larger:
   a. Assembly: ASSE 1015 and AWWA C510 with corrosion resistant internal parts and stainless steel springs; two independently operating check valves.
   b. Check Valves: Manufactured from epoxy-coated cast iron, epoxy-coated ductile iron, or stainless steel.
   c. Isolation Valves: Epoxy-coated NRS, OS&Y or Butterfly valves on inlet and outlet.
   d. Epoxy Coatings: AWWA C550.
   e. End Connections: Flanged or Grooved.
   f. Operation: Continuous-pressure applications.
   g. Maximum Working Pressure: 175 psi.
   h. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
   i. Working Temperature Range: 33 to 140 degrees F .
   j. Configuration: Designed for horizontal, vertical, or N-pattern flow.
   k. Accessories:
      1) Test cocks.

B Hose-Connection Backflow Preventers:
1. Valve: ASSE 1052, brass, nonremovable once installed, drainable, with hose-thread end connections.
   a. Provide with chrome finish when associated faucet, hose bibb, or hydrant is specified in chrome.

2. Maximum Working Pressure: 125 psi.
3. Operation: Up to 10-foot head of water back pressure.
4. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
5. Capacity: At least 3-gpm flow.
6. Working Temperature Range: 33 to 180 degrees F.

C Backflow-Preventer Test Kits:
1. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.3 VACUUM BREAKERS

A Atmospheric Vacuum Breakers:
1. Valve: ASSE 1001, brass, bronze, or copper silicon alloy.
2. Maximum Working Pressure: 125 psi.
3. Working Temperature Range: 33 to 180 degrees F.
4. Inlet and Outlet Connections: Threaded.

B Hose-Connection Vacuum Breakers:
1. Valve: ASSE 1011, brass, nonremovable, drainable, with hose-thread end connections.
2. Maximum Working Pressure: 125 psi.
3. Working Temperature Range: 33 to 180 degrees F.
4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.

C Pressure Vacuum Breakers:
1. Valve: ASSE 1020, bronze or copper silicon alloy.
2. Maximum Working Pressure: 150 psi.
3. Operation: Continuous-pressure applications.
4. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
5. Working Temperature Range: 33 to 140 degrees F.
6. Accessories:
   a. Valves: Ball type, on inlet and outlet.

D Spill-Resistant Vacuum Breakers:
1. Valve: ASSE 1056, bronze or copper silicon alloy.
2. Maximum Working Pressure: 150 psi.
3. Operation: Continuous-pressure applications.
4. Working Temperature Range: 33 to 180 degrees F.
5. Accessories:
   a. Valves: Ball type, on inlet and outlet.

E Laboratory-Faucet Vacuum Breakers:
1. Standard: ASSE 1035.
2. Body: Bronze.
3. End Connections: Threaded.
4. Finish: Chrome plated.

2.4 MIXING VALVES

A Lavatory/Sink Thermostatic Water Mixing Valves:
1. Manufacturers:
   a. Leonard Valve Company.
   b. Powers; a Watts Industries Co.
   c. Symmons Industries, Inc.
   d. Watts: www.watts.com.
   e. Or pre-approved equivalent.
2. Description: Pre-piped, factory-fabricated, exposed-mounting, thermostatically controlled, water-mixing-valve. Automatic temperature adjustment and set-point.
3. Standards: Comply with ASSE 1069 and/or 1070.
4. Internal check stops and screens.
5. Temperature adjustment lock-down.
6. Component Pressure Ratings: 125 psig minimum, unless otherwise indicated.
7. Material: Lead Free copper or bronze body with corrosion-resistant interior components.
8. Connections: Threaded union inlets and outlet.

2.5 BALANCING VALVES

A Automatic Balancing Valves:
1. Valve: Brass, pressure independent, with removable cartridge.
   a. Provide with metering ports.
   b. Provide with union on inlet and outlet.
2. Calibration: Control flow within 5 percent of rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi (24 kPa).
3. Maximum Working Pressure: 200 psi.
4. Working Temperature Range: 33 to 200 degrees F.

2.6 OUTLET BOXES

A See Drawings for Plumbing Fixture Schedules with requirements for single-fixture and appliance outlet boxes.

2.7 HYDRANTS

A See Drawings for Plumbing Fixture Schedules with requirements for wall hydrants and roof hydrants.

2.8 WATER-HAMMER ARRESTORS

A Piston Type:
1. Description: ASSE 1010 or PDI-WH 201, stainless steel or copper construction.
2. Air Preload Pressure: 60 psi.
3. Maximum Working Pressure: 150 psi.
4. Working Temperature Range: 33 to 180 degrees F.

2.9 RELIEF VALVES

A Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.10 AIR VENTS

A General:
1. Pressure Rating: 125-psig minimum pressure rating at 140 degrees F.
2. Mechanism and Seat: Stainless steel.
3. Size: NPS 1/2 minimum inlet.

B Manual Type: Short vertical sections of 2 inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.

C Float Type:
1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

D Washer Type:
1. Brass with hygroscopic fiber discs, vent ports, adjustable cap for manual shut-off, and integral spring loaded ball check valve.

PART 3 EXECUTION

3.1 EXAMINATION

A Discard packing materials and verify product interiors are free from debris, damage, and corrosion.

B Verify end connections, flanges, threads, and grooves are completely clean without signs of damage or degradation that could result in leakage.

C For products containing isolation or shutoff valves, verify isolation and shutoff valves operate smoothly from fully closed to fully open.

3.2 INSTALLATION

A Prior to installation of domestic water piping specialties, flush domestic water piping of foreign material.

B Install products in accordance with manufacturer's instructions.

C Install products level and plumb.

D Install products with clearance for access and maintenance.

E Support products NPS 2-1/2 and larger independently of surrounding pipe.

F Support products with flanged or grooved ends independently of surrounding pipe.

G Install shutoff valve in each water supply to plumbing specialties. Use ball, gate, or globe valve if specific valve is not indicated. Install shutoff valves in accessible locations.

H For products containing isolation or shutoff valves, locate valves in horizontal piping with stems at or above center of piping, maintaining unimpeded stem movement.

I Install escutcheons at wall, floor, and ceiling penetrations in exposed finish locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

J Backflow Preventers:
1. Install backflow preventers in accordance with requirements of local authorities having jurisdiction, including requirements of local water utility.

K Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur. Local code requirements on the type of backflow preventer or vacuum breaker shall be followed. Locations where potable water protection devices are required include, but are not limited to:
1. Chemical dispensers (dish washers, laundry machines, vehicle washing systems, mechanical system treatment injection, etc.).
2. Countertop appliances (coffee makers, ice machines, etc.).
3. Fire protection systems.
4. Flush valves.
5. Hose bibbs (exterior and interior).
6. Irrigation systems.
7. Janitor rooms (mop sinks, service sinks, bed pan washer, etc.).
8. Premise water supply isolation.

L Pipe relief from backflow preventer to nearest drain.

M Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet. Pipe in strict accordance with manufacturers' recommendations.
1. Install thermometers on water regulators.

N Balancing Valves:
1. Install in accessible locations.
2. Install shutoff valves on inlet and outlet.
3. Install identification tag, attached by chain, factory marked with the zone identification, valve number, and flow rate.

O Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs.

P Water Hammer Arrestors: Size and install in accordance with PDI-WH 201.
1. Install at hot and cold water supply piping to lavatory sinks, washing machine outlets, flush valves, ice makers, and any other device with a quick closing valve.

Q Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.

3.3 FIELD QUALITY CONTROL

A Inspect each product for damage and defects.

B Repair or replace damaged products.

C Replace defective products.

D For products containing isolation or shutoff valves, exercise isolation and shutoff valves from fully closed to fully open. Confirm smooth operation.

E Backflow Preventers:
1. Test in accordance with manufacturer's instructions.
2. Test in accordance with requirements of authorities having jurisdiction.
3. Test in accordance with ASSE listing of backflow preventer.
4. Replace backflow preventers that fail testing.

F Vacuum Breakers:
1. Test in accordance with manufacturer's instructions.
2. Test in accordance with requirements of authorities having jurisdiction.
3. Test in accordance with ASSE listing of vacuum breaker.
4. Replace vacuum breakers that fail testing.

G Coordination of Other Tests and Inspections: Provide access to accommodate tests and inspections by independent testing agencies employed by Owner.

3.4 ADJUSTING

A Adjust mixing valves to design temperature set point.

3.5 CLEANING

A Clean products to remove dirt, paint, and other foreign materials.

B Clean surfaces of products exposed to view in finished spaces to remove dirt, fingerprints, paint, and other foreign materials. Restore finishes to match original factory finish.

C Clean surfaces of products exposed to view on building exterior to remove dirt, fingerprints, paint, and other foreign materials. Restore finishes to match original factory finish.

D Clean strainers, including those internal to other products, prior to substantial completion.

3.6 PROTECTION

A Protect installed products from damage due to subsequent construction operations.

END OF SECTION

SECTION 221123

DOMESTIC WATER PUMPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A Circulators.

1.2 REFERENCE STANDARDS

A ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks.

B ASME A13.1 - Scheme for the Identification of Piping Systems.

C ICC (IPC) - International Plumbing Code.

D NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

E NFPA 70 - National Electrical Code.

F NSF 61 - Drinking Water System Components - Health Effects.

G UL 778 - Standard for Motor-Operated Water Pumps.

1.3 SUBMITTALS

A Product Data:
1. Provide certified pump curve with duty point marked over pump and system operating conditions and NPSH curve and power requirement by pump tag.
2. Manufacturer's catalog sheets for accessories and supplies.

B Shop Drawings: Include dimensions and performance data.

C Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

D Project Record Documents: Record actual locations of components.

E Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

F Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Pump Seals: One of each type and size.

1.4 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing type of products specified in this section, with minimum three years of documented experience.

B Certifications: Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc, as suitable for purpose specified and indicated.

C Identification: Provide pumps with manufacturer's name, model number, and rated capacity identified by permanently attached label.

D Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

1.5 DELIVERY, STORAGE, AND HANDLING

A Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 WARRANTY

A Manufacturer Warranty: Provide 1-year manufacturer warranty for pumps except circulator type. Complete forms in Owner's name and register with manufacturer.

B Manufacturer Warranty: Provide 5-year manufacturer warranty for circulators. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Equipment Schedules for Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 CIRCULATORS

A Manufacturers:
1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com/#sle.
2. Bell & Gossett, a Brand of Xylem, Inc: www.xylem.com/#sle.
3. Grundfos Pumps Corporation: www.grundfos.com/#sle.
4. Taco, Inc: www.tacocomfort.com/#sle.
5. Or pre-approved equivalent.

B Casing: Stainless steel with bronze cast impeller or other corrosion-resistant non-metalic material for domestic water use, and stainless steel rotor assembly.

C Shaft: Alloy steel or ceramic with integral thrust collar and two oil-lubricated bronze sleeve bearings.

D Mechanical Seal: Carbon rotating against a stationary ceramic seat.

E Pipe-End Connection: Flange or union connection.

F Maximum Discharge Pressure: 125 psi.

G Motor: 1,750 rpm, ECM duty with flexible coupling.

H Service Temperature Range: Minus 30 to 250 degrees F.

I Controls: Provide aquastat set for high-temp cutoff, electric plug, and illuminated hand switch.

J BMS or Other Integrated Automation Link: Provide auxiliary contacts for fault and run status.

K Accessories: Include inlet-outlet temperature and pressure gauges with 2-way isolation valves.

2.3 DOMESTIC WATER CIRCULATING PUMP CONTROLS

A Basis of Design: Xylem AQS

B UL approved.

C Thermostats: Electronic; programmable for control of hot-water circulation pump.

D Type: Bimetal surface temperature sensor, for installation on hot-water circulation piping. Stainless steel piping clip.

E Operation of Pump: On at 100 degrees F or off at 120 degrees F (adj.).

F Power Requirement: 120 V, ac.
1. Transformer: Provide if required.

PART 3 EXECUTION

3.1 INSTALLATION

A Install products with related fittings, and accessories according to manufacturer instructions.

B Potable and Drinking Water Service: Provide NSF 61 certified; comply with ICC (IPC).

C Electrical-Driven Pump Work:
1. Provide electric-motor-driven equipment specified complete with local disconnect switch and control panel with starter, controls, safety devices, and related wiring.
2. Provide automatic control and protective devices field-wired to interface-related devices required for specified operation.

D Ensure that small pressure gauges are installed on both upstream and downstream ends.

E Circulator Pump Installation:
1. Suspend inline pumps using threaded rod and vibration isolation hangers to support pump independent of piping.

F Factory-Provided Pump Controls: Factory provided, tested for use.

G Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are nonoverloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

H Coordinate BAS, BMS, or Integrated Automation linking between unit controller and remote front-end interface; see Section 230923.

3.2 CONNECTIONS

A Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

B Drawings indicate general arrangement of piping, fittings, and specialties.

C Install piping adjacent to pumps to allow service and maintenance.

D Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.
1. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps.
2. Install shutoff valve and strainer on suction side of pumps, and check valve and throttling valve on discharge side of pumps. Install valves same size as connected piping.
3. Install pressure gages at suction and discharge of pumps. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps.

3.3 STARTUP SERVICE

A Engage a factory-authorized service representative to perform startup service.
1. Complete installation and startup checks according to manufacturer's written instructions.
2. Check piping connections for tightness.
3. Clean strainers on suction piping.
4. Set thermostats and timers for automatic starting and stopping operation of pumps.
5. Perform the following startup checks for each pump before starting:
   a. Verify bearing lubrication.
   b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
   c. Verify that pump is rotating in the correct direction.
6. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
7. Start motor.
8. Open discharge valve slowly.
9. Adjust temperature settings on thermostats.
10. Adjust timer settings.

3.4 DEMONSTRATION

A Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain pumps and controls.

3.5 FIELD QUALITY CONTROL

A Operational Tests: Upon completion and sterilization of plumbing systems, conduct operating tests to demonstrate satisfactory, functional, and operating efficiency.

B Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections and to assist in field testing. Report results in writing.

3.6 PROTECTION

A Protect installed products from damage due from subsequent construction operations.

B Repair or replace products damaged before Date of Substantial Completion.

END OF SECTION

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SECTION 221319

SANITARY WASTE PIPING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A Floor drains.

B Floor sinks.

C Cleanouts.

D Miscellaneous Sanitary Waste Piping Specialties.

1.2 REFERENCE STANDARDS

A ASME A112.6.3 - Floor Drains.

B ASME A112.6.7 - Sanitary Floor Sinks.

C ASME A112.36.2 - Cleanouts.

D ASSE 1072 - Performance Requirements for Barrier Type Floor Drain Trap Seal Protection Devices.

E NSF 14 - Plastics Piping System Components and Related Materials.

1.3 SUBMITTALS

A Product Data: Provide manufacturer's literature and data sheets for each product. Include information on fabrication materials, assembly of components, dimensions, ratings, finishes, rough-in requirements, and installed accessories.

B Shop Drawings:
1. Floor sinks: Provide drawings overlaid on latest published plumbing plans showing dimensioned locations of floor sinks.

1.4 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section.

1.5 DELIVERY, STORAGE, AND HANDLING

A Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

B Keep products in original manufacturer's packaging and protect from damage until ready for installation.

C Store products under cover and protected from weather and dirt. Elevate above grade.

D Store plastic products protected from direct sunlight.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A See Drawings for Plumbing Fixture Schedules with requirements for floor drains and floor sinks.

B Plastic Sanitary Waste Piping Specialties: Provide plastic products that comply with NSF 14.

C Source Limitations: Furnish drains and sanitary waste piping specialties of same kind by same manufacturer.

2.2 FLOOR DRAINS

A Cast Iron Floor Drains:
1. Manufacturers:
   a. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   b. Josam Company: www.josam.com.
   c. MIFAB, Inc: www.mifab.com/#sle.
   d. Zurn Industries, LLC: www.zurn.com/#sle.
2. Assembly: ASME A112.6.3.

2.3 FLOOR SINKS

A Cast Iron Floor Sinks:
1. Manufacturers:
   a. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   b. Josam Company: www.josam.com.
   c. MIFAB, Inc: www.mifab.com/#sle.
   d. Zurn Industries, LLC: www.zurn.com/#sle.
   e. Or pre-approved equivalent.
2. Assembly: ASME A112.6.7.
3. Body: Cast iron with white acid-resistant enameled interior and interior anti-splash dome strainer.

B Stainless Steel Floor Sinks:
1. Manufacturers:
   a. FoodSafe Drains, a Division of Global Drain Technologies: www.foodsafedrains.com.
   b. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   c. Josam Company: www.josam.com.
   d. MIFAB, Inc: www.mifab.com.
   e. Zurn Industries, LLC: www.zurn.com.
   f. Or pre-approved equivalent.
2. Assembly: ASME A112.6.7.
3. Body: Fabricated, Type 304 stainless steel with interior anti-splash dome strainer.

2.4 CLEANOUTS

A Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
2. Josam Company; Josam Div.: www.josam.com.
3. MIFAB, Inc: www.mifab.com/#sle.
4. Tyler Pipe Company (McWane, Inc.): www.tylerpipe.com.
5. Watts: www.watts.com.
6. Zurn Industries, LLC: www.zurn.com/#sle.
7. Or pre-approved equivalent.

B Floor Cleanouts:
1. Assembly: ASME A112.36.2.
2. Body: Lacquered cast iron.
3. Closure Plug: Bronze, threaded, gastight and watertight.
4. Top: Adjustable, with vandal-proof screws.
   a. Shape and Finish:
      1) All Locations, Unless Noted Otherwise: Round; nickel bronze.
      2) Tile: Square; nickel bronze.

C Wall Cleanouts:
1. Assembly: ASME A112.36.2.
2. Body: Tee type; body material to match surrounding pipe.
3. Plug: Bronze, threaded, gastight.
4. Access Cover: Round, stainless steel wall access cover with vandal-proof screw.

2.5 MISCELLANEOUS SANITARY WASTE PIPING SPECIALTIES

A Floor Drain Trap Seals:
1. Assembly: ASSE 1072.
2. Description: Push-fit EPDM or silicone fitting with one-way-flow membrane or flapper.
3. Insert shall easily flex open when fluid enters the drain and automatically close and seal once the drain is empty to protect the trap liquid from evaporation and create a physical barrier blocking sewer gases from escaping the piping system.
4. Size per manufacturer requirements for specific drain outlet.

PART 3 EXECUTION

3.1 EXAMINATION

A Verify conditions are satisfactory for installation prior to starting work.

B Verify floor sink locations are coordinated with latest published plumbing plans.

3.2 INSTALLATION

A Install products in accordance with manufacturer's instructions.

B Maintain continuity of waterproofing membranes. Secure waterproofing membranes to drain clamping collars and bonding flanges.

C Install drains so strainers and grates are level and are at design elevation.

D Install floor sinks so grates are flush with finished floor unless noted otherwise or unless directed otherwise by adopted code.

E Extend cleanouts to finished floor or wall surface. Ensure clearance at cleanout for rodding or jetting of drainage system.

F Install floor cleanouts to allow for floor finishes.

G Locate, provide, and install cleanouts in piping in accordance with adopted code.

H Encase exterior cleanouts in concrete flush with grade.

3.3 CLEANING

A Clean debris from drains.

B Clean grates and strainers prior to final completion

3.4 PROTECTION

A Protect installed drains from accumulating dirt and debris through remainder of construction.

B Protect installed products from damage due to subsequent construction operations.

END OF SECTION

SECTION 221429

SUMP PUMPS

PART 1 GENERAL

1.1 SECTION INCLUDES

A Elevator shaft sump pumps.

1.2 REFERENCE STANDARDS

A ICC (IPC) - International Plumbing Code.

B UL (DIR) - Online Certifications Directory.

1.3 SUBMITTALS

A Specification Compliance Review.

B Product Data: Provide certified pump chart or curve with duty point marked over.

C Shop Drawings: Include dimensions and performance data.

D Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

E Executed warranty.

1.4 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section.

B Certifications: UL (DIR) listed, classified, and suitable for the purpose specified and indicated.

C Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

1.5 DELIVERY, STORAGE, AND HANDLING

A Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.6 WARRANTY

A Manufacturer Warranty: Provide 2-year manufacturer warranty for pumps and related components. Complete forms in Owner's name and register with manufacturer.

B Submit warranty with related forms completed in Owner's name and registered with manufacturer.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Equipment Schedules for Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 MANUFACTURERS:

A ABS Pumps, Inc.

B Armstrong Pumps Inc.

C Aurora Pump; Pentair Pump Group (The).

D Barnes; Crane Pumps & Systems.

E Bell & Gossett Domestic Pump; ITT Industries.

F Chicago Pump Company; a division of Yeomans Chicago Corporation.

G Deming Pumps; Crane Pumps & Systems.

H Federal Pump Corp.

I Flygt; ITT Industries.

J Goulds Pumps; ITT Industries.

K Grundfos Pumps Corporation.

L Liberty Pumps.

M Little Giant Pump Co.

N McDonald, A. Y. Mfg. Co.

O Metropolitan Industries, Inc.

P Myers, F. E.; Pentair Pump Group (The).

Q Paco Pumps, Inc.

R PROFLO.

S Stancor.

T Sterling Peerless; Sterling Fluid Systems Group.

U Superior Pump.

V Swaby Manufacturing Co.

W Weil Pump Company, Inc.

X Weinman Div.; Crane Pumps & Systems.

Y Zoeller Company.

Z Or pre-approved equivalent

2.3 ELEVATOR SHAFT SUMP PUMPS

A Minimum Performance: 3000 gph (50 gpm)
1. ASME A17.1:
    a. In elevators provided with Firefighters' Emergency Operation, a drain or sump pump shall be provided. The sump pump/drain shall have the capacity to remove a minimum of 11.4 m3/h (3,000 gal/h) per elevator.

B General:
1. Rugged stainless steel and cast iron housing and base with legs that elevate the pump to permit flow into impeller, oil or air filled motor chamber, grease-lubricated ball bearings, and double mechanical seal.
2. Factory-assembled and tested, simplex, single-stage, centrifugal, end-suction, submersible, direct-connected sump pumps complying with UL 778 and HI 1.1-1.2 and HI 1.3 for submersible sump pumps.

C Impeller: Cast iron; statically and dynamically balanced, open nonclog design, overhung, single suction, keyed and secured to stainless steel shaft.

D Motor: Base mount, enclosed, lubricated oil-free, thermal-overload protected, continuous duty, permanent split capacitor with oil-resistant, three-prong connector, chord length as required for controller location.

E Controls:
1. NEMA 250, Type 6, 120-V ac, float switch, mounted on discharge piping.
2. Oil Minder System:
    a. Factory installed oil sensor probe detection system, hermetically sealed, heavy duty, stainless steel with low voltage self-cleaning technology.
    b. Oil sensor probe voltage shall not exceed 15 millivolts DC until it comes in contact with water, at which point the oil sensor returns to 5VDC.
    c. The low 15 millivolt DC input shall reduce the potential field and subsequent metal ion exchange, preventing buildup of foreign matter on the probe surface.
    d. The pump control float and oil sensing probe are to be factory mounted on the pump and factory tested.
    e. The control panel to include a high decibel warning horn buzzer complete with alarm silencing switch. A clearly marked terminal board with unpowered remote monitoring contacts for connection to the BMCS shall be included as standard.
    f. Provide factory hard wiring of pump, oil probe and floats into the NEMA 4X control box. All cables between the pump and control box shall be 16’ long as standard.

g. Provide dry contacts for remote monitoring of oil detected, high water/sump level alarm/motor overload.
h. The pumping system shall be capable of pumping water while containing oil. The system shall function automatically and shall provide local visual LED indicator lights for each of the following events:
   1) Presence of oil in the sump when the pump is signaled to run.
   2) High liquid in the sump.
   3) High amps or a locked rotor motor condition.
   4) Electrical power to the panel.
   5) Pump activation.

F Solids Handling Capacity: Pass lint and other small solids up to 1/2 inch in size.

G Pump Discharge Piping: Factory or field fabricated, ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe.

H Discharge Pipe Size: As indicated in drawing detail, NPT, female.

I Sump Cover: Cast iron or steel with bituminous coating and strong enough to be walkable.

PART 3 EXECUTION

3.1 INSTALLATION

A Install products with related fittings and accessories according to manufacturer instructions.

B Install pumps and arrange to provide access for maintenance including removal of motors, impellers, couplings, and accessories.

C Set submersible sump pumps on basin floors. Make direct connections to drainage piping.
1. Anchor guide-rail supports to basin bottoms and sidewalls or covers. Install pumps so pump and discharge pipe disconnecting flanges make positive seals when pumps are lowered into place.

D Observe and provide incidentals required to complete installation in compliance with ICC (IPC).

3.2 FIELD QUALITY CONTROL

A Operational Tests: Conduct operating tests to demonstrate satisfactory, functional, and operating efficiency.

B Complete installation and startup checks according to manufacturer's written instructions.

C Check piping connections for tightness.

D Perform the following startup checks for each pump before starting:
1. Verify bearing lubrication.
2. Verify that pump is free to rotate by hand. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
3. Verify that pump is rotating in the correct direction.

E Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.3 DEMONSTRATION

A Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

3.4 PROTECTION

A Protect installed products from damage from subsequent construction operations.

END OF SECTION

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SECTION 223000

PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A Diaphragm-type compression tanks.

1.2 DEFINITIONS

A FRP: Fiberglass-reinforced plastic.

B HDPE: High-density polyethylene plastic.

C LDPE: Low-density polyethylene plastic.

D PE: Polyethylene plastic.

E ABS: Acrylonitrile-butadiene-styrene plastic.

F PVC: Polyvinyl chloride plastic.

G NBR: Acrylonitrile-butadiene rubber.

H PP: Polypropylene plastic.

I ppm: Parts per million.

1.3 REFERENCE STANDARDS

A ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels.

B ICC (IPC) - International Plumbing Code.

1.4 SUBMITTALS

A Product Data:
1. Product Data: Provide manufacturer's literature and data sheets for each product. Include information on materials of fabrication, assembly of components, dimensions, weights, capabilities, performance, electrical characteristics, location and sizes of connections, service and access locations, and manufacturer-provided and field-installed accessories.

B Shop Drawings:
1. Provide plans and elevations showing equipment assembly, including fabrication and installation details. Show location and sizes of connections.
   a. Indicate anchors, attachments, and lifting points.
   b. Include arrangements of adjacent piping and valves.

2. Indicate clearances required for service, access, maintenance, and replacement of internal components.

C Manufacturer's qualification statement.

D Project Record Documents: Record actual locations of components.

E Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

F Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.7 WARRANTY

A Manufacturer's standard form in which manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
1. Warranty Period(s): From date of Substantial Completion:
   a. Compression Tanks: Five years.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Equipment Schedules for Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 DIAPHRAGM-TYPE COMPRESSION TANKS

A Manufacturers:
1. Amtrol Inc: www.amtrol.com.
2. ITT Bell & Gossett: www.bellgossett.com.
3. Taco, Inc: www.taco-hvac.com.
4. Armstrong Pumps, Inc.
5. Niles Steel Tank.
6. Smith, A. O.; Aqua-Air Div.Fe
7. State Industries, Inc.
8. Watts Regulator Co.
9. Wessels Co.
10. Or pre-approved equivalent.

B Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible butyl-rubber or EPDM diaphragm sealed into tank, and steel legs or saddles.

C Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.

D Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

PART 3 EXECUTION

3.1 INSTALLATION

A Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions required for applicable certifications.

B Coordinate system, equipment, and piping work with applicable electrical, fuel, gas, vent, drain, and waste support interconnections as included or provided by other trades.

3.2 FIELD QUALITY CONTROL

3.3 CONTROL INSTALLATION

A Install immersion-type thermostats in hot-water return piping.

3.4 CONNECTIONS

A Coordinate piping installations and specialty arrangements with schematics on Drawings and with requirements specified in piping systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

B Drawings indicate general arrangement of piping, fittings, and specialties.

C Arrange piping for easy removal of water heaters.

3.5 FIELD QUALITY CONTROL

A Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections and to assist in field testing. Report results in writing.

B Perform the following field tests and inspections and prepare test reports:
1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

D Perform the following final checks before filling:
1. Verify that air precharge in precharged tanks is correct.
2. Test operation of tank accessories and devices.
3. Verify that pressure relief valves have correct setting.
   a. Manually operate pressure relief valves.
   b. Adjust pressure settings.
4. Verify that vacuum relief valves are correct size.
   a. Manually operate vacuum relief valves.
   b. Adjust vacuum settings.

E Filling Procedures: Follow manufacturer's written procedures. Fill tanks with water to operating level.

3.6 DEMONSTRATION

A Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heaters and controls.

END OF SECTION

SECTION 223400

COMMERCIAL FUEL-FIRED DOMESTIC WATER HEATERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A Commercial, high-efficiency, gas water heaters.

B Water heater accessories.

1.2 REFERENCE STANDARDS

A ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2009.

B ANSI Z21.10.3 - Gas Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous Water Heaters; 2008.

C ASME (BPV VIII, 1) - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; The American Society of Mechanical Engineers; 2007.

1.3 SUBMITTALS

A Product Data:
1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
2. Indicate pump type, capacity, power requirements.
3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
4. Provide electrical characteristics and connection requirements.

B Shop Drawings:
1. Indicate dimensions of tanks, tank lining methods, anchors, attachments, lifting points, tappings, and drains.

C Project Record Documents: Record actual locations of components._____.

D Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

E Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.

B Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

C Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.5 CERTIFICATIONS

A Water Heaters: NSF approved.

B Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1 or ANSI Z21.10.3, as applicable, in addition to requirements specified elsewhere.

C Pressure Vessels for Heat Exchangers: ASME labeled, to ASME (BPV VIII, 1).

D Water Tanks: ASME labeled, to ASME (BPV VIII, 1).

1.6 DELIVERY, STORAGE, AND HANDLING

A Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.7 WARRANTY

A Special Fuel-Fired Water Heater Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired water heaters that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
   a. Structural failures including storage tank and supports.
   b. Faulty operation of controls.
   c. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Warranty Period(s): From date of Substantial Completion:
   a. Commercial, Gas Water Heaters:
      1) Storage Tank: Three years.
      2) Controls and Other Components: Three years.

PART 2 PRODUCTS

2.1 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Equipment Schedules for Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.2 MANUFACTURERS:

A Commercial:
1. AERCO International.
2. American Water Heater Company.
3. Bock Water Heaters, Inc.
4. Bosch.
5. Bradford White Corporation.
6. GSW Water Heating Company.
7. HESco Industries, Inc.
8. Intellihot
9. Laars Heating Systems; Waterpik Technologies, Inc.
10. Lochinvar Corporation.
11. Navien.
12. NORITZ America Corporation.
13. Precision Boilers.
14. PVI Industries, LLC.
15. RBI Water Heaters; a Mestek, Inc. Company.
16. Rheem Water Heater Div.; Rheem Manufacturing Company.
17. Rinnai.
18. Ruud Water Heater Div.; Rheem Manufacturing Company.
19. Smith, A. O. Water Products Company.
20. State Industries, Inc.
21. Or pre-approved equivalent.

2.3 COMMERCIAL, GAS WATER HEATERS

A Commercial, High-Efficiency, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
1. Description: Manufacturer's proprietary design to provide at least 90 percent combustion efficiency at optimum operating conditions. Following features and attributes may be modified or omitted if water heater otherwise complies with requirements for performance.
2. Storage-Tank Construction: ASME-code steel with 150-psig minimum working-pressure rating.
   a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
      1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
      2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
   b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Tank, combustion chamber and fire tubes will be constructed from phase-balanced austenitic and ferritic duplex steel with a chemical structure containing a minimum of 21% chromium to prevent corrosion and mill certified per ASTM A 923 Methods A to ensure that the product is free of detrimental chemical precipitation that affects corrosion resistance. Thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
3. Factory-Installed, Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
c. Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
e. Jacket: Steel with enameled finish.
f. Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

4. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for high-efficiency water heaters and for natural-gas fuel.
5. Automatic Ignition: AMSI Z21.20, electric, automatic, gas ignition system.
6. Temperature Control: Adjustable thermostat.
7. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
8. Single point electrical connection.

2.4 WATER HEATER ACCESSORIES

A Gas Shutoff Valves: ANSI Z21.15/CGA 9.1, manually operated. Furnish for installation in piping.

B Gas Pressure Regulators: ANSI Z21.18, appliance type. Include pressure rating, capacity, and pressure differential required between gas supply and water heater.

C Gas Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.

D Combination Temperature and Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select each relief valve with sensing element that extends into storage tank.
1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.

E Pressure Relief Valves: Include pressure setting less than working-pressure rating of water heater.
1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.

F Piping Manifold Kits: Water heater manufacturer's factory-fabricated inlet and outlet piping arrangement for multiple-unit installation. Include piping and valves for field assembly that is capable of isolating each water heater and of providing balanced flow through each water heater.

G Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

PART 3 EXECUTION

3.1 WATER HEATER INSTALLATION

A Install commercial water heaters on concrete bases.

B Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

C Install gas water heaters according to NFPA 54.

D Install gas shutoff valves on gas supplies to gas water heaters without shutoff valves.

E Install gas pressure regulators on gas supplies to gas water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.

F Install automatic gas valves on gas supplies to gas water heaters, if required for operation of safety control.

G Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

H Install combination temperature and pressure relief valves in water piping for water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

I Install water heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains.

J Install thermometer on outlet piping of water heaters.

K Install pressure gage(s) on inlet and outlet piping of commercial, fuel-fired water heater piping.

L Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve and thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet.

M Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.

N Charge compression tanks with air.

O Suspend inline pumps using threaded rod and vibration isolation hangers to support pump independent of piping.

3.2 CONNECTIONS

A Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B Install piping adjacent to pumps to allow service and maintenance. Arrange piping for easy removal of water heaters.

C Ground equipment according to Division 26 Sections.

D Connect wiring according to Division 26 Sections.

3.3 FIELD QUALITY CONTROL

A Perform the following field tests and inspections and prepare test reports:
1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

3.4 DEMONSTRATION

A Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heaters, controls, and pumps.

END OF SECTION

SECTION 224000

PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES

A Conventional plumbing fixtures and related components.

B Under-lavatory pipe supply covers.

C Fixture Carriers

1.2 REFERENCE STANDARDS

A ADA Standards - 2010 ADA Standards for Accessible Design.

B ASHRAE Std 18 - Methods of Testing for Rating Drinking-Water Coolers with Self-Contained Mechanical Refrigeration.

C ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use.

D ASME A112.18.1 - Plumbing Supply Fittings.

E ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures.

F ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures.

G ASME A112.19.2 - Ceramic Plumbing Fixtures.

H ASME A112.19.3 - Stainless Steel Plumbing Fixtures.

I ASME A112.19.1 - Enamelled Cast Iron and Enamelled Steel Plumbing Fixtures.

J ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks.

K ASME A112.19.14 - Six-Liter Water Closets Equipped with a Dual Flushing Device.

L ASSE 1070 - Performance Requirements for Water Temperature Limiting Devices.

M ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

N ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

O ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping.

P ASTM D570 - Standard Test Method for Water Absorption of Plastics.

Q ASTM D638 - Standard Test Method for Tensile Properties of Plastics.

R ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and +30°C with a Vitreous Silica Dilatometer.

S ASTM D785 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials.

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

U ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

V IAPMO Z124 - Plastic Plumbing Fixtures.

W ICC A117.1 - Accessible and Usable Buildings and Facilities.

X NSF 61 - Drinking Water System Components - Health Effects.

Y NSF 372 - Drinking Water System Components - Lead Content.

Z UL (DIR) - Online Certifications Directory.

1.3 SUBMITTALS

A Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

B Manufacturer's Instructions: Indicate installation methods and procedures.

C Sustainable Design Documentation: Submit appropriate evidence that materials used in potable water systems comply with the specified requirements.

D Maintenance Data: Include fixture trim exploded view and replacement parts lists.

E Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Extra Faucet Washers: One set of each type and size.
2. Extra Lavatory Supply Fittings: One set of each type and size.
3. Extra Toilet Seats: One of each type and size.
4. Flush Valve Service Kits: One for each type and size.
5. Extra Loose Keys for Outside Hose Bibbs: One.
6. Extra Hose End Vacuum Breakers for Hose Bibbs: One.

G Substitutions: The architect and owner shall have final say if a submitted fixture that does not match the scheduled fixture may be considered as an acceptable alternate. Any deviation from the scheduled fixtures should be issued for design team review at the begining of the project as a Substitution Request and not as part of the submittal package.

1.4 QUALITY ASSURANCE

A Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section

1.5 DELIVERY, STORAGE, AND HANDLING

A Accept fixtures on-site in factory packaging. Inspect for damage.

B Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.6 WARRANTY

A Provide five year manufacturer warranty for electric water cooler.

1.7 MAINTENANCE MATERIALS

A Furnish maintenance materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A Potable Water Systems: Provide drinking water system components certified as complying with NSF 61 and NSF 372.

B ADA: Where indicated to be ADA-compliant, provide fixtures complying with ADA Standards and ICC A117.1.

2.2 REGULATORY REQUIREMENTS

A Comply with applicable codes for installation of plumbing systems.

B Comply with UL (DIR) requirements.

C Perform work in accordance with local health department regulations.

D Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

E Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"" Public Law 90-480, "Architectural Barriers Act;" and Public Law 101-336, "American with Disabilities Act;" for fixtures for people with disabilities.

G Comply with "Reduction of Lead in Drinking Water Act", 2011, which defines “lead free” with regard to pipes, pipe fittings, plumbing fittings and fixtures.

H NSF/ANSI 372 - Drinking Water System Components – Lead Content

I NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

J ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.

K ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.

L ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.

M ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."

2.3 PERFORMANCE, CAPACITIES AND CHARACTERISTICS

A See Drawings for Fixture Schedules with Equipment Performance Requirements when capacities and characteristics are not indicated in the specifications.

2.4 MANUFACTURERS

A This list of alternate manufacuters does not constitute a pre-approval of any individual plumbing fixtrure substitution or deviation from the scheduled fixtures. Any fixtures issued to the design team for review as a substitution request shall be from one of the manufacturers listed below.

B Plumbing Fixtures:
1. American Standard, Inc.
    a. Crane Plumbing
    b. DXV
    c. Eljer
    d. Fiat
    e. Safety Tubs
2. Grohe America, Inc.
3. Kohler Co.
4. Sloan Commercial.
5. Toto USA, Inc.
6. Zurn Plumbing Products Group; Commercial.
7. Or pre-approved equivalent.

C Stainless Steel Sinks:
1. Elkay.
2. Just.

3. Kohler.
4. Moen - Commercial.
5. Or pre-approved equivalent.

D Faucets:
1. American Standard.
2. Brasscraft
3. Chicago.
4. Crane.
5. Dearborn
6. Delta - Commercial.
7. Eljer.
8. Elkay.
9. Grohe America, Inc.
10. Hydrotek
11. Kohler.
12. MAC
13. Moen - Commercial.
14. Symmons
15. T&S Brass.
16. Wolverine Brass
17. Zurn Plumbing Products Group; Commercial.
18. Or pre-approved equivalent.

E Flushometers and Flushvalves:
1. American Standard.
2. Delaney.
3. Gerber
4. Hydrotek
5. Moen - Commercial.
6. Sloan.
7. Toto.
8. Zurn Plumbing Products Group; Commercial.
9. Or pre-approved equivalent.

F Toilet Seats:
1. American Standard
2. Bemis.
3. Beneke.
4. Centoco.
5. Comfort
6. Church.
7. Kohler.
8. Zurn Plumbing Products Group; Commercial.
9. Or pre-approved equivalent.

G Fixture Supports and Carriers:
1. Grohe America, Inc.
2. JOSAM Company: www.josam.com.

3. Zurn Industries, Inc: www.zurn.com.
4. J. R. Smith: www.jrsmith.com
5. Ancon.
6. Wade.
7. Zurn Plumbing Products Group; Specification Drainage Operation.
8. Or pre-approved equivalent.

H Mop Sinks:
1. Acorn Engineering Co.
2. Crane Plumbing/Fiat Products.
3. Fiat
4. Florestone Products Co.
5. Mustee, E. L. & Sons, Inc.
6. Stern-Williams Co., Inc.
7. Zurn Plumbing Products Group; Commercial.
8. Or pre-approved equivalent.

I Electric Water Coolers and Drinking Fountains:
1. Elkay Manufacturing Co.
2. Halsey Taylor.
3. Haws Corporation.
4. Murdock Manufacturing, Inc
5. Oasis Corporation.
6. Sunroc Corporation.
7. Or pre-approved equivalent.

2.5 UNDER-LAVATORY PIPE SUPPLY COVERS

A General:
1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
2. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
3. Construction: 1/8 inch PVC with antimicrobial, antifungal and UV resistant properties.
   a. Comply with ASTM E84 for flame and smoke development.
   b. Comply with ASTM C1822 Type III for covers on accessible lavatory piping.
   c. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
   d. Comply with ICC A117.1.
   e. Thermal Resistance: R value of 0.504 or lower when tested by ASTM C177.
   f. Thermal Conductivity: K value of 0.358 or density of 21.61 pcf per ASTM C518.
   g. Microbial and Fungal Resistance for Interior and Exterior: Comply with ASTM G21.
4. Color: High gloss white.
5. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.6 FIXTURE CARRIERS AND ACCESSORIES

A Lavatory and Sink Accessories:

1. Chrome plated 17 gage brass tailpiece and P-trap with clean-out plug and arm with escutcheon.
2. Offset waste with perforated open strainer.
3. Screwdriver stops.
4. Rigid supplies at wall mounted lavatorys.
5. Flexible supplies at counter mounted lavatorys and sinks.

B Wall Hung Lavatory Carrier:
1. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, concealed arm supports, bearing plate and studs.

C Wall Hung Urinal Carriers:
1. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

D Wall Hung Water Closet Carriers:
1. ASME A112.6.1M; adjustable cast iron frame, integral drain hub and vent, adjustable spud, front and rear lugs for floor and wall attachment, threaded fixture studs with nuts and washers.
2. Rated for minimum 500 lbs. duty.

PART 3 EXECUTION

3.1 EXAMINATION

A Verify walls, floors, and finishes are prepared and ready for installation of fixtures.

B Verify rough-ins for field connections match sizes and locations shown on drawings.

C Verify electric power is available and of the correct characteristics.

D Review casework and countertop shop drawings. Confirm locations and sizes of fixtures and openings before rough-in and installation.

E Verify casework and countertops are prepared and ready for installation of fixtures.

3.2 INSTALLATION

A Install products in accordance with manufacturer's instructions.

B Install components level and plumb, according to manufacturer's rough-in requirements.

C Secure fixtures in place.

D Install rigid or flexible supplies to fixtures. Provide supply stops, reducers, and escutcheons.

E See architectural requirements for fixture mounting heights.

3.3 FIELD QUALITY CONTROL

A Inspect each product for damage and defects.

B Repair or replace damaged or defective products.

C Test fixtures after installation to verify operation. Correct deficiencies.

D Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.

E Attached all fixture carriers to building floor, wall or substrate with fasteners, bolts, washers,etc. of sizes and specifications as required by the fixture carrier manufacturer.

F Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.

G Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.

H Install wall-mounting fixtures with tubular waste piping attached to supports.

I Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.

J Install counter-mounting fixtures in and attached to casework.

K Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

L Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

M Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach. Coordinate flushometer height with grab bars.

N Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

O Install toilet seats on water closets.

P Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.

Q Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

R Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install on countertop at sink. Connect inlet hose to dishwasher and outlet hose to sink tailpiece.

S Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.

T Set service basins in leveling bed of cement grout.

U Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

V Assemble emergency plumbing fixture piping, fittings, control valves, and other components.

W Install thermometers in supply and outlet piping connections to water-tempering equipment.

X Install mounting frames affixed to building construction and attached recessed water coolers to mounting frames, unless otherwise indicated.

Y Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.

Z Verify that installed plumbing fixtures are categories and types specified for locations where installed.

AA Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.

3.4 CONNECTIONS TO EQUIPMENT AND FIXTURES

A Piping installation requirements are specified in other sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B Extend piping and connect fixtures with water supplies, stops, risers, with traps, soil, waste, and vent piping as required by code and as indicated. Use size fittings required to match fixtures.

3.5 PLUMBING FIXTURES FURNISHED BY OTHERS

A Rough-in and install plumbing fixtures furnished by others or provided as components in casework, cabinetry or countertops.

B Provide supplies, stops, tailpieces and p-traps as required to complete installation.

C Provide faucets and accessories as indicated.

3.6 CONTROL WIRING

A Provide all incidental wiring required to make the fixtures, equipment or systems fully operational. Coordinate with equipment manufacture incidental power and control wiring requirements.

B Incidental wiring includes but not limited to:
1. Plumbing Fixture power and control:
    a. Faucets
    b. Flush valves

c. Transformers
d. Flow switches
e. Alarms

2. Water Heaters
3. Equipment Motors Starters
4. Loose Motor Starters
5. Pushbutton Stations and Emergency Stop Switches
6. Pumps
7. Remote Monitoring and Control Panels (Provided by Equipment Manufacturers)
8. Temporary Plumbing Equipment

3.7 ADJUSTING

A Adjust stops and valves so fixtures operate without splashing, noise, or overflow.

3.8 CLEANING

A Clean plumbing fixtures to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.9 PROTECTION

A Protect installed products from damage due to subsequent construction operations.

B Do not permit use of fixtures by construction personnel.

END OF SECTION

END OF VOLUME 1 OF 2