PROJECT MANUAL

New Community Supervision Center

Joplin, Missouri

Designed By: ACI Boland Architects
1710 Wyandotte St
Kansas City, Missouri 64108

Date Issued: September 30, 2026

Project No.: C2512-01

VOLUME ONE

STATE *of* MISSOURI

OFFICE *of* ADMINISTRATION

Facilities Management, Design and Construction

SECTION 00 01 04
DISCLAIMER - ARCHITECT

I hereby state that all documents intended to be authenticated by my seal are limited to the following:

PROJECT MANUAL:

1. All sections included in the Project manual Table of Contents from Div 01 Thru Div 13
   NOTE: Individual sections are listed by section number. Division numbers listed include all sections listed in the Table of Contents for that Division.

DRAWINGS:

1. All Drawings as indicated on the A000 Sheet index that contain the prefix A or AD.

I hereby disclaim any responsibility for all other specifications, estimates, reports, or other documents or instruments related to or intended to be used for any part or parts of this architectural project

SEAL:



Date: 09/30/2026

Name: Dominic Spadafore

State of Missouri Registration #A-2025003940

Discipline: Architecture

Title: Principal Architect

Company: ACI / Boland, Inc.

END OF DOCUMENT

SECTION 00 01 05
DISCLAIMER - CIVIL

I hereby state that all documents intended to be authenticated by my seal are limited to the following:

PROJECT MANUAL:

221113	221313	311000	312000	321216	321313
321373	313100	334100			

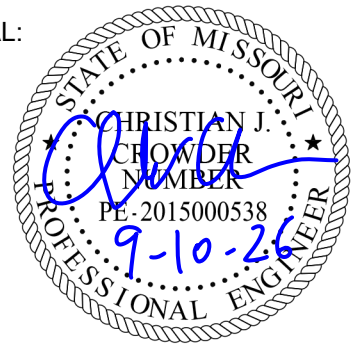
NOTE: Individual sections are listed by section number. Division numbers listed include all sections listed in the Table of Contents for that Division.

DRAWINGS:

C Series					

I hereby disclaim any responsibility for all other specifications, estimates, reports, or other documents or instruments related to or intended to be used for any part, or parts, of this architectural project.

SEAL:



Date: 09/30/2026

Name: Christian Crowder

State of Missouri Registration # 2015000538

Discipline: Civil Engineering

Title: Project Engineer

Company: Kaw Valley Engineering

END OF DOCUMENT

SECTION 00 01 06
DISCLAIMER - STRUCTURAL

I hereby state that all documents intended to be authenticated by my seal are limited to the following:

PROJECT MANUAL:

031000	032000	033000	042200	51200	52100
053100	054000	054400			

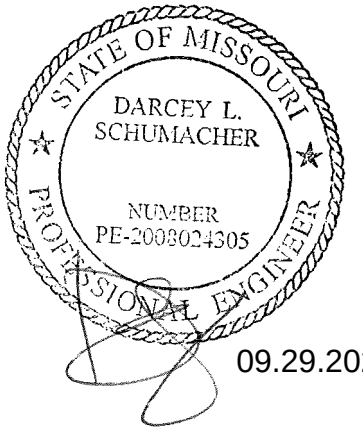
NOTE: Individual sections are listed by section number. Division numbers listed include all sections listed in the Table of Contents for that Division.

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S-504	S-505				

I hereby disclaim any responsibility for all other specifications, estimates, reports, or other documents or instruments related to or intended to be used for any part, or parts, of this architectural project.

SEAL:



09.29.2026

Date: 09/30/2026

Name: ____Darcey L. Schumacher, PE_____

State of Missouri Registration #___2008024305_____

Discipline: Structural Engineering

Title: _____Principal_____

Company: [Wallace Design Collective, PC]

END OF DOCUMENT

Wallace Design Collective, PC
Professional Engineering Corporation
Missouri Certificate of Authorization #001268

SECTION 00 01 07
DISCLAIMER - MECHANICAL

I hereby state that all documents intended to be authenticated by my seal are limited to the following:

PROJECT MANUAL:

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DRAWINGS:

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SEAL:



Date: 09/30/2026

Name: __Greg Fendler_____

State of Missouri Registration # _PE-2006037230_____

Discipline: Mechanical Engineering

Title: _Principle_____

Company: Lankford Fendler + associates

END OF DOCUMENT

SECTION 00 01 08
DISCLAIMER - ELECTRICAL

I hereby state that all documents intended to be authenticated by my seal are limited to the following:

PROJECT MANUAL:

NOTE: Individual sections are listed by section number. Division numbers listed include all sections listed in the Table of Contents for that Division.

DRAWINGS:

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SEAL:



Date: 09/30/2026

Name: __Greg Fendler_____

State of Missouri Registration # _PE-2006037230_____

Discipline: Mechanical Engineering

Title: _Principle_____

Company: Lankford Fendler + associates

END OF DOCUMENT

SECTION 00 01 09
DISCLAIMER - PLUMBING AND FIRE PROTECTION

I hereby state that all documents intended to be authenticated by my seal are limited to the following:

PROJECT MANUAL:

NOTE: Individual sections are listed by section number. Division numbers listed include all sections listed in the Table of Contents for that Division.

DRAWINGS:

I hereby disclaim any responsibility for all other specifications, estimates, reports, or other documents or instruments related to or intended to be used for any part, or parts, of this architectural project.

SEAL:



Date: 09/30/2026

Name: __Greg Fendler_____

State of Missouri Registration # _PE-2006037230_____

Discipline: Mechanical Engineering

Title: _Principle_____

Company: Lankford Fendler + associates

END OF DOCUMENT

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NOTICE TO BIDDERS

The following procurement forms can be found on our website at:
https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans
and shall be submitted with your bid to FMDCBids@oa.mo.gov

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A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section provides a comprehensive list of the drawings that comprise the Bid Documents for this project.

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PART 3 - EXECUTION

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A. The following list of drawings is a part of the Bid Documents:

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END OF SECTION 000115

SECTION 001116 - INVITATION FOR BID

1.0 OWNER:

A. The State of Missouri
Office of Administration,
Division of Facilities Management, Design and Construction
Jefferson City, Missouri

2.0 PROJECT TITLE AND NUMBER:

A. New Community Supervision Center
Joplin, Missouri
Project No.: C2512-01

3.0 BIDS WILL BE RECEIVED:

A. Until: 1:30 PM, November 12, 2026

B. **Only electronic bids sent to FMDCBids@oa.mo.gov shall be accepted: (See Instructions to Bidders for further detail)**

4.0 DESCRIPTION:

A. Scope: The project includes all necessary components to create a functional new Community Supervision Center as depicted in the drawings and specifications.

B. MBE/WBE/SDVE/HDVE Goals: MBE **0%**, WBE **0%**, and SDVE **3%** or HDVE **3%**. **NOTE: Only MBE/WBE firms certified by the State of Missouri Office of Equal Opportunity as of the date of bid opening, or SDVE(s)/HDVE(s)meeting the requirements of Section 34.069, RSMo, Section 34.074, RSMo and 1 CSR 30-5.010, can be used to satisfy the MBE/WBE/SDVE/HDVE participation goals for this project.**

5.0 PRE-BID MEETING:

A. Place/Time**:** 10:00 AM, October 27, 2026, at Missouri Career Center - Joplin: 730 South Wall Avenue Joplin, MO 64801

B. Access to State of Missouri property requires presentation of a photo ID by all persons.

6.0 HOW TO GET PLANS & SPECIFICATIONS:

A. View Only Electronic bid sets are available at no cost or paper bid sets for a deposit of $200.00 from American Document Solutions (ADS). MAKE CHECKS PAYABLE TO: American Document Solutions. Mail to: American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433, https://www.adsplanroom.net. NOTE: Prime contractors will be allowed a maximum of two bid sets at the deposit rate shown above. Other requesters will be allowed only one bid set at this rate. Additional bid sets or parts thereof may be obtained by any bidder at the cost of printing and shipping by request to American Document Solutions at the address shown above. Bidder must secure at least one bid set to become a planholder.

B. **Refunds: Return plans and specifications in unmarked condition within 15 working days of bid opening to American Document Solutions, 1400 Forum Blvd., Suite 7A, Columbia, Missouri 65203. Phone 573-446-7768, Fax 573-355-5433. Deposits for plans not returned within 15 working days shall be forfeited.**

C. Information for upcoming bids, including downloadable plans, specifications, Invitation for Bid, bid tabulation, award, addenda, and access to the ADS planholders list, is available on the Division of Facilities Management, Design and Construction's web site: https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans.

7.0 POINT OF CONTACT:

A. Project Manager: Nathan Graessle, email: nathaniel.graessle@oa.mo.gov

8.0 GENERAL INFORMATION:

A. The State reserves the right to reject any and all bids and to waive all informalities in bids. No bid may be withdrawn for a period of 20 working days subsequent to the specified bid opening time. The contractor shall pay not less than the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed, as determined by the Missouri Department of Labor and Industrial Relations and as set out in the detailed plans and specifications.

B. Bid results will be available at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans after it is verified that at least one bid is awardable and affordable.

SECTION 002113 – INSTRUCTIONS TO BIDDERS

1.0 - SPECIAL NOTICE TO BIDDERS

A. If awarded a contract, the Bidder's employees, and the employees of all subcontractors, who perform the work on the project must adhere to requirements in Section 013513 – Site Security and Health Requirements as applicable per Agency.

B. The Bidder's prices shall include all city, state, and federal sales, excise, and similar taxes that may lawfully be assessed in connection with the performance of work, and the purchased of materials to be incorporated in the work. **THIS PROJECT IS NOT TAX EXEMPT.**

2.0 - BID DOCUMENTS

A. The number of sets obtainable by one (1) party may be limited in accordance with available supply.

B. For the convenience of contractors, subcontractors and suppliers, bidding documents are available on the Owner's website at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans.

3.0 - BIDDERS' OBLIGATIONS

A. Bidders must carefully examine the entire site of the work and shall make all reasonable and necessary investigations to inform themselves thoroughly as to the facilities available as well as to all the difficulties involved in the completion of all work in accordance with the specifications and the plans. Bidders are required to examine all maps, plans and data mentioned in the specifications. No plea of ignorance concerning observable existing conditions or difficulties that may be encountered in the execution of the work under this contract will be accepted as an excuse for any failure or omission on the part of the successful Bidder (contractor) to fulfill every detail of the requirements of the contract, nor accepted as a basis for any claims for extra compensation or time extension.

B. Under no circumstances will Bidders give their plans and specifications to other Bidders. It is highly encouraged, but not required, that all Bidders be on the official planholders list to receive project updates including but not limited to any addenda that are issued during the bidding process.

4.0 - INTERPRETATIONS

A. No Bidder shall be entitled to rely on oral or written representations from any person as to the meaning of the plans and specifications or the acceptability of alternate products, materials, form or type of construction.

B. Bidders shall make all requests for interpretations in writing and submit all requests to the Project Manager identified in Section 007300 – Supplementary Conditions with all necessary supporting documentation no less than five (5) working days before opening of bids. Responses to requests for interpretation will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.

C. Bidders shall make all requests for an "Acceptable Substitution" on the Section 006325 Substitution Request Form. The request shall be emailed to the Project Manager identified in Section 007300 – Supplementary Conditions no less than five (5) working days before opening of bids. Responses to requests for substitutions will be issued via a written addendum and will be sent as promptly as is practicable to all official planholders and posted on the Owner's website. All such addenda shall become part of the bid and contract documents.

D. An "Acceptable Substitution" requested after the award of bid will only be approved if proven to the satisfaction of the Owner and the Designer that the product is acceptable in design, strength, durability, usefulness, and convenience for the purpose intended. Approval of the substitution after award is at the sole discretion of the Owner and all requests of this nature must be submitted in accordance with Article 3.1 of the General Conditions.

5.0 - BIDS AND BIDDING PROCEDURE

A. Bidders shall submit all submission forms and accompanying documents listed in Section 004113 – Bid Form, Article 5.0, Attachments to Bid by the stated time on the bid documents or the bid will be rejected for being non-responsive.

B. Depending on the specific project requirements, **the following is a GENERIC list** of all possible bid forms that may be due with bid submittals. Bidders must verify each specific project's requirements in Section 004113 to ensure they have provided all the required documentation with their submission.

Bid Submittal – due before stated date and time of bid opening (see IFB):

004113	Bid Form (all pages are always required)
004322	Unit Prices Form
004336	Proposed Subcontractors Form
004337	MBE/WBE/SDVE/HDVE Compliance Evaluation Form
004338	MBE/WBE/SDVE/HDVE Eligibility Determination for Joint Ventures
004339	MBE/WBE/SDVE/HDVE GFE Determination
004340	SDVE Business Form
004340.1	HDVE Business Form
004541	Affidavit of Work Authorization
004545	Anti-Discrimination Against Israel Act Certification form

C. The Bidder shall submit its bid on the forms provided by the Owner in the same file format (PDF) with each space fully and properly completed, typewritten or legibly printed, including all amounts required for alternate bids, unit prices, cost accounting data, etc. The Owner will reject bids that are not on the Owner's forms and that do not contain all requested information. All forms can be found on the Owner's website at https://oa.mo.gov/facilities/bid-opportunities/bid-listing-electronic-plans and shall be submitted to FMDCBids@oa.mo.gov.

D. All bids shall be submitted without additional terms and conditions, modifications, or reservations. The completed forms shall not include interlineations, alterations, or erasures. Bids not in compliance with the requirements of this paragraph will be rejected as non-responsive.

E. All bids shall be accompanied by a bid bond executed by the bidder and a duly authorized surety company, certified check, cashier's check or bank draft made payable to the Division of Facilities Management, Design and Construction, State of Missouri, in the amount indicated in the bid documents in Section 004113. Failure of the Bidder to submit the duly authorized bid bond or the full amount required shall be sufficient cause to reject his bid. The Bidder agrees that the proceeds of the check, draft, or bond shall become the property of the State of Missouri, if for any reason the Bidder withdraws his bid after bid closing or if the Bidder, within ten (10) working days after notification of award, refuses or is unable to 1) execute the tendered contract, 2) provide an acceptable performance and payment bond, or 3) provide evidence of required insurance coverage.

F. The bid bond check or draft submitted by the successful Bidder will be returned after the receipt of an acceptable performance and payment bond and execution of the formal contract. Checks or drafts of all other Bidders will be returned within a reasonable time after it is determined that the bid represented by same will receive no further consideration by the State of Missouri.

6.0 - SIGNING OF BIDS

A. A bid shall contain the full and correct legal name of the Bidder. If the Bidder is an entity registered with the Missouri Secretary of State, the Bidder's name on the bid form shall appear as shown in the Secretary of State's records. If the Bidder is an entity organized in a state other than Missouri, the Bidder must provide a Certificate of Authority to do business in the State of Missouri.

B. If the successful Bidder is doing business in the State of Missouri under a fictitious name, the Bidder shall furnish to Owner, attached to the Bid Form, a properly certified copy of the certificate of Registration of Fictitious Name from the State of Missouri, and such certificate shall remain on file with the Owner.

C. A bid from an individual shall be signed as noted on the Bid Form.

D. A bid from a partnership or joint venture shall require only one signature of a partner, an officer of the joint venture authorized to bind the venture, or an attorney-in-fact. If the bid is signed by an officer of a joint venture or an attorney-in-fact, a document evidencing the individual's authority to execute contracts should be included with the bid form.

E. A bid from a limited liability company (LLC) shall be signed by a manager or a managing member of the LLC.

F. A bid from a corporation shall have the correct corporate name thereon and the signature of an authorized officer of the corporation. Title of office held by the person signing for the corporation shall appear, along with typed name of said individual and the corporate license number shall be provided. In addition, for corporate proposals, the President or Vice-President listed per the current filing with the Missouri Secretary of State should sign as the Bidder. If the signatory is other than the corporate president or vice president, the bidder must provide satisfactory evidence that the signatory has the legal authority to bind the corporation.

7.0 - RECEIVING BID SUBMITTALS

A. It is the Bidder's sole responsibility to ensure receipt of the bid submittals by Owner on or before the date and time specified in the Invitation for Bid or as modified via written addenda. Bids received after the date and time specified will not be considered by the Owner.

B. All bids shall be received via email at FMDCBids@oa.mo.gov. A bid submitted through any other means, including hard copies, will not be considered and will be discarded by the Owner unopened.

8.0 - MODIFICATION AND WITHDRAWAL OF BIDS

A. Bidder may withdraw a bid at any time prior to the scheduled closing time for receipt of bids, but no bidder may withdraw his bid for a period of twenty (20) working days after the scheduled closing time for receipt of bids.

B. Bidder may modify a bid until the scheduled closing time by sending a revised bid to FMDCBids@oa.mo.gov with a note in the subject line and body of the email that it is a revised bid. A revised bid sent via any other method will not be considered.

9.0 - AWARD OF CONTRACT

A. The Owner reserves the right to reject any and/or all bids and further to waive all informalities in bidding when deemed in the best interest of the State of Missouri.

B. The Owner reserves the right to let other contracts in connection with the work including, but not limited to, contracts for the furnishing and installation of furniture, equipment, machinery, appliances and other apparatuses.

C. The Owner will award a contract to the lowest, responsive, and responsible Bidder in accordance with Section 8.250, RSMo. No contract will be awarded to any Bidder who has had a contract with the Owner terminated within the preceding twelve months for material breach of contract or who has been suspended or debarred by the Owner.

D. Award of alternates, if any, will be made in numerical order unless all bids received are such that the order of acceptance of alternates does not affect the determination of the lowest, responsive, responsible bidder.

E. No award shall be considered binding upon the Owner until the written contract has been properly executed and the following documentation has been provided: 1) performance and payment bond consistent with Article 6.1 of the General Conditions; 2) proof of the required insurance coverage; 3) an executed Section 004541 - Affidavit of Work Authorization form; and 4) documentation evidence enrollment and participation in a federal work authorization program.

F. Failure to execute and return the contract and associated documents within the prescribed period shall be treated, at the option of the Owner, as a breach of Bidder's obligation and the Owner shall be under no further obligation to Bidder.

G. Transient employers subject to Sections 285.230 and 285.234, RSMo, (out-of-state employers who temporarily transact any business in the State of Missouri) may be required to file a bond with the

Missouri Department of Revenue. No contract will be awarded by the Owner unless the successful Bidder certifies that he has complied with all applicable provisions of Section 285.230-234.

H. Sections 285.525 and 285.530, RSMo, require business entities to enroll and participate in a federal work authorization program in order to be eligible to receive award of any state contract in excess of $5,000. Bidders should submit with their bid an Affidavit of Work Authorization (Section 004541) along with appropriate documentation evidencing such enrollment and participation. Bidders must also submit an E-Verify Memorandum before the Owner may award a contract to the Bidder. Information regarding E-Verify is located at https://www.e-verify.gov/employers/enrolling-in-e-verify. The contractor shall be responsible for ensuring that all subcontractors and suppliers associated with this contract enroll in E-Verify.

I. The successful Bidder must be registered in MissouriBUYS powered by MOVERS at https://missouribuys.mo.gov/supplier-registration# as an approved vendor prior to being issued a contract.

10.0 - CONTRACT SECURITY

A. The successful Bidder shall furnish a performance/payment bond as set forth in General Conditions Article 6.1 prior to the State executing the contract and issuing a notice to proceed.

11.0 - WORKING DAYS

A. Contract duration time is stated in working days and will use the following definition in determining the actual calendar date for contract completion:

1. Working days are defined as all calendar days except Saturdays, Sundays and the following State of Missouri observed holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday, Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day, Thanksgiving Day and Christmas Day.

12.0 - AMERICAN AND MISSOURI - MADE PRODUCTS AND FIRMS

A. By signing the bid form and submitting a bid on this project, the Bidder certifies that it will use American and Missouri products as set forth in Article 1.7 of the General Conditions. Bidders are advised to review those requirements carefully prior to bidding.

B. A preference shall be given to Missouri firms, corporations or individuals, or firms, corporations or individuals that maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less.

C. Pursuant to Section 34.076, RSMo, a contractor or Bidder domiciled outside the boundaries of the State of Missouri shall be required, in order to be successful, to submit a bid the same percent less than the lowest bid submitted by a responsible contractor or Bidder domiciled in Missouri as would be required for such a Missouri domiciled contractor or Bidder to succeed over the bidding contractor or Bidder domiciled outside Missouri on a like contract or bid being let in the Bidder's domiciliary state and, further, the contractor or Bidder domiciled outside the boundaries of Missouri shall be required to submit an audited financial statement as would be required of a Missouri domiciled contractor or Bidder on a like contract or bid being let in the domiciliary state of that contractor or Bidder.

13.0 – ANTI-DISCRIMINATION AGAINST ISRAEL ACT CERTIFICATION:

A. If the Bidder meets the section 34.600, RSMo., definition of a "company" and the Bidder has ten or more employees, the Bidder must certify in writing that the Bidder is not currently engaged in a boycott of goods or services from the State of Israel and shall not engage in a boycott of goods or services from the State of Israel, if awarded a contract, for the duration of the contract. The Bidder is required to complete and submit the applicable portion of Section 004545 - Anti-Discrimination Against Israel Act Certification with its Bid Form. The applicable portion of the exhibit must be submitted prior to execution of a contract by the Owner and issuance of Notice to Proceed.

14.0 - MBE/WBE/SDVE/HDVE INSTRUCTIONS

A. Definitions:

1. **"MBE"** means a Minority Business Enterprise.

2. **"MINORITY"** has the same meaning as set forth in 1 CSR. 10-17.010.

3. **"MINORITY BUSINESS ENTERPRISE"** has the same meaning as set forth in section 37.020, RSMo.

4. **"WBE"** means a Women's Business Enterprise.

5. **"WOMEN'S BUSINESS ENTERPRISE"** has the same meaning as set forth in section 37.020, RSMo.

6. **"SDVE"** means a Service-Disabled Veterans Enterprise.

7. **"SERVICE-DISABLED VETERAN"** has the same meaning as set forth in section 34.074, RSMo.

8. **"SERVICE-DISABLED VETERAN ENTERPRISE"** has the same meaning as "Service-Disabled Veteran Business" set forth in section 34.074, RSMo.

9. **"HDVE" means an Honorably Discharged Veteran Enterprise**

10. **"Honorably Discharged Veteran" has the same meaning as set forth in section 34.069, RSMo.**

11. **"Honorably Discharged Veteran Enterprise"** has the same meaning as "Honorably Discharged Veteran Business" set forth in section 34.069, RSMo.

B. MBE/WBE/SDVE/HDVE General Requirements:

1. For all bids greater than $100,000, the Bidder shall obtain MBE, WBE, SDVE or HDVE participation in an amount equal to or greater than the percentage goals set forth in the Invitation for Bid and the Bid Form, unless the Bidder is granted a Good Faith Effort waiver by the Director of the Division, as set forth below. If the Bidder does not meet the MBE, WBE, SDVE or HDVE goals, or make a good faith effort to do so, the Bidder shall be nonresponsive, and its bid shall be rejected.

2. The Bidder should submit with its bid all the information requested in the MBE/WBE/SDVE/HDVE Compliance Evaluation Form for every MBE, WBE, SDVE, or HDVE subcontractor or material supplier the Bidder intends to use for the contract work. The Bidder is required to submit all MBE/WBE/SDVE/HDVE documentation before the stated time and date set forth in the Invitation for Bid. If the Bidder fails to provide such information by the specified date and time, the Owner shall reject the bid.

3. The Director reserves the right to request additional information from a Bidder to clarify the Bidder's proposed MBE, WBE, SDVE, or HDVE participation. The Bidder shall submit the clarifying information requested by the Owner within two (2) working days of receiving the request for clarification.

4. Pursuant to section 34.069, RSMo and section 34.074, RSMo, a Prime Bidder that qualifies as an SDVE or HDVE shall receive a three-percentage point bonus preference in the contract award evaluation process. The bonus preference will be calculated and applied by reducing the bid amount of the eligible SDVE or HDVE by three percent of the apparent low responsive Bidder's bid. Based on this calculation, if the eligible SDVE's or HDVE's evaluation is less than the apparent low responsive Bidder's bid, the eligible SDVE's or HDVE's bid will become the apparent low responsive bid. This reduction is for evaluation purposes only and will have no impact on the actual amount(s) of the bid or the amount(s) of any contract awarded. In order to be eligible for the SDVE or HDVE preference, the Bidder must complete and submit with its bid the Missouri Service-Disabled Veteran Business Form or the Missouri Honorably Discharged Veterans Business Form, and any information required by the form.

C. Computation of MBE/WBE/SDVE/HDVE Goal Participation:

1. A Bidder who is a MBE, WBE, SDVE, or HDVE may count 100% of the contract towards the MBE, WBE, SDVE, or HDVE goal, less any amounts awarded to another MBE, WBESDVE, or HDVE. (NOTE: a MBE firm that bids as general contractor must obtain WBE and SDVE or HDVE participation; a WBE firm that bids as a general contractor must obtain MBE and SDVE or HDVE participation; and a SDVE or HDVE firm that bids as general contractor must obtain

MBE and WBE participation.) For the remaining contract amount to be counted towards the MBE, WBE or SDVE goal, the Bidder must complete the MBE/WBE/SDVE/HDVE Compliance Evaluation Form (Section 004337) identifying itself as an MBE, WBE, SDVE or HDVE.

2. The total dollar value of the work granted to a certified MBE, WBE, SDVE or HDVE by the Bidder shall be counted towards the applicable goal.

3. Expenditures for materials and supplies obtained from a certified MBE, WBE, SDVE, or HDVE supplier or manufacturer may be counted towards the MBE, WBE, SDVE or HDVE goals, if the MBE, WBE, SDVE, or HDVE assumes the actual and contractual responsibility for the provision of the materials and supplies.

4. The total dollar value of the work granted to a second or subsequent tier subcontractor or a supplier may be counted towards a Bidder's MBE, WBE, SDVE or HDVE goals, if the MBE, WBE, SDVE or HDVE properly assumes the actual and contractual responsibility for the work.

5. The total dollar value of work granted to a certified joint venture equal to the percentage of the ownership and control of the MBE, WBE, SDVE or HDVE partner in the joint venture may be counted towards the MBE/WBE/SDVE/HDVE goals.

6. Only expenditures to a MBE, WBE, SDVE or HDVE that performs a commercially useful function in the work may be counted towards the MBE, WBE, SDVE or HDVE goals. A MBE, WBE, SDVE or HDVE performs a commercially useful function when it is responsible for executing a distinct element of the work and carrying out its responsibilities by performing, managing and supervising the work or providing supplies or manufactured materials.

D. Certification of MBE/WBE/SDVE/HDVE Subcontractors:

1. In order to be counted towards the goals, an MBE or WBE must be certified by the State of Missouri Office of Equal Opportunity and an SDVE/HDVE must be certified by the State of Missouri, Office of Equal Opportunity or by the Federal U.S. Small Business Administration directory.

2. The Bidder may determine the certification status of a proposed MBE or WBE subcontractor or supplier by referring to the Office of Equal Opportunity (OEO)'s online MBE/WBE directory https://apps1.mo.gov/MWBCertifiedFirms/. The Bidder may determine the eligibility of a SDVE/HDVE subcontractor or supplier by referring to the Office of Equal Opportunity online SDVE/HDVE directory at https://oeo.mo.gov/sdve-certification-program/ or the Federal U.S. Small Business Administration directory https://veterans.certify.sba.gov/#search.

3. Additional information, clarifications, or other information regarding the MBE/WBE/SDVE/HDVE listings in the directories may be obtained by contacting the Contract Specialist of record as shown in the Supplementary Conditions (Section 007300).

E. Waiver of MBE/WBE/SDVE/HDVE Participation:

1. If a Bidder has made a good faith effort to secure the required MBE, WBE, SDVE or HDVE participation and has failed, the Bidder shall submit with its bid the information requested in MBE/WBE/SDVE/HDVE Good Faith Effort (GFE) Determination form. The Director will determine if the Bidder made a good faith effort to meet the applicable goals. If the Director determines that the Bidder did not make a good faith effort, the bid shall be rejected as being nonresponsive to the bid requirements. Bidders who demonstrate that they have made a good faith effort to include MBE, WBE, SDVE or HDVE participation will be granted a waiver and will be considered to be responsive to the applicable participation goals, regardless of the percent of actual participation obtained, if the bid is otherwise acceptable.

2. In determining whether a Bidder has made a good faith effort to obtain MBE, WBE, SDVE or HDVE participation, the Director may evaluate the factors set forth in 1 CSR 30-5.010(6)(C) and the following:

   a. The amount of actual participation obtained;

b. How and when the Bidder contacted potential MBE, WBE, SDVE, or HDVE subcontractors and suppliers;

c. The documentation provided by the Bidder to support its contacts, including whether the Bidder provided the names, addresses, phone numbers, and dates of contact for MBE/WBE/SDVE/HDVE firms contacted for specific categories of work;

d. If project information, including plans and specifications, were provided to MBE/WBE/SDVE/HDVE subcontractors;

e. Whether the Bidder made any attempts to follow-up with MBE, WBE, SDVE or HDVE firms prior to bid;

f. Amount of bids received from any of the subcontractors and/or suppliers that the Bidder contacted;

g. The Bidder's stated reasons for rejecting any bids;

F. Contractor MBE/WBE/SDVE/HDVE Obligations

1. If awarded a contract, the Bidder will be contractually required to subcontract with or obtain materials from the MBE, WBE, SDVE, HDVE firms listed in its bid, in amounts equal to or greater than the dollar amount in the bid, unless the amount is modified in writing by the Owner.

2. If the Contractor fails to meet or maintain the participation requirements contained in the Contractor's bid, the Contractor must satisfactorily explain to the Director why it cannot comply with the requirement and why failing meeting the requirement was beyond the Contractor's control. If the Director finds the Contractor's explanation unsatisfactory, the Director may take any appropriate action including, but not limited to:

   a. Declaring the Contractor ineligible to participate in any contracts with the Division for up to twelve (12) months (suspension); and/or

   b. Declaring the Contractor be nonresponsive to the Invitation for Bid, or in breach of contract and rejecting the bid or terminating the contract.

3. If the Contractor replaces an MBE, WBE, SDVE or HDVE during the course of the contract, the Contractor shall replace it with another MBE, WBE, SDVE or HDVE or make a good faith effort to do so. All MBE, WBE, SDVE or HDVE substitutions must be approved by the Director in writing.

4. The Contractor shall provide the Owner with regular reports on its progress in meeting its MBE/WBE/SDVE/HDVE obligations. At a minimum, the Contractor shall report the dollar-value of work completed by each MBE, WBE, SDVE or HDVE during the preceding month and the cumulative total of work completed by each MBE, WBE, SDVE or HDVE to date with each monthly application for payment. The Contractor shall also make a final report, which shall include the total dollar-value of work completed by each MBE, WBE, SDVE or HDVE during the entire contract.

State of Missouri
Construction Contract

THIS AGREEMENT is made (DATE) by and between:

Contractor Name and Address

hereinafter called the "Contractor," and the **State of Missouri**, hereinafter called the **"Owner"**, represented by the Office of Administration, Division of Facilities Management, Design and Construction.

WITNESSETH, that the Contractor and the Owner, for the consideration stated herein agree as follows:

ARTICLE 1. STATEMENT OF WORK

The Contractor shall furnish all labor and materials and perform all work required for furnishing and installing all labor, materials, equipment and transportation and everything necessarily inferred from the general nature and tendency of the plans and specifications for the proper execution of the work for:

Project Name:	**New Community Supervision Center** **Joplin, Missouri**
Project Number:	**C2512-01**

in strict accordance with the Contract Documents as enumerated in Article 7, all of which are made a part hereof.

ARTICLE 2. TIME OF COMPLETION

The contract performance time is **250 working days** from the transmittal date of this agreement. The contract completion date is **MONTH, DAY, YEAR**. This time includes ten (10) working days for the Contractor to receive, sign and return the contract form along with required bonding and insurance certificates. Failure of the Contractor to provide correct bonding and insurance within the ten (10) working days shall not be grounds for a time extension. Receipt of proper bonding and insurance is a condition precedent to the formation of the contract and if not timely received, may result in forfeiture of the Contractor's bid security. Work may not commence until the Owner issues a written Notice to Proceed and must commence within seven (7) working days thereafter.

ARTICLE 3. LIQUIDATED DAMAGES

Whenever time is mentioned in this contract, time shall be and is of the essence of this contract. The Owner would suffer a loss should the Contractor fail to have the work embraced in this contract fully completed on or before the time above specified. THEREFORE, the parties hereto realize in order to adjust satisfactorily the damages on account of such failure that it might be impossible to compute accurately or estimate the amount of such loss or damages which the Owner would sustain by reason of failure to complete fully said work within the time required by this contract. The Contractor hereby covenants and agrees to pay the Owner, as and for **liquidated damages, the sum of $1,000** per day for each and every day, Sunday and legal holidays excepted, during which the work remains incomplete and unfinished. Any sum which may be due the Owner for such damages shall be deducted and retained by the Owner from any balance which may be due the Contractor when said work shall have been finished and accepted. But such provisions shall not release the Bond of the Contractor from liability according to its terms. In case of failure to complete, the Owner will be under no obligation to show or prove any actual or specific loss or damage.

SAMPLE

ARTICLE 4. CONTRACT SUM

The Owner shall pay the Contractor for the prompt, faithful and efficient performance of the conditions and undertakings of this contract, subject to additions, and deductions as provided herein, in current funds the sum of:

Base Bid: $

Accepted Alternates, if applicable to the Project and accepted by the Owner.

TOTAL CONTRACT AMOUNT: ($CONTRACT AMOUNT)

UNIT PRICES: The Owner accepts the following Unit Prices:

For changing specified quantities of work from those indicated by the contract drawings and specifications, upon written instructions of Owner, the following unit prices shall prevail. The unit prices include all labor, overhead and profit, materials, equipment, appliances, bailing, shoring, shoring removal, etc., to cover the finished work of the several kinds of work called for. Only a single unit price shall be given and it shall apply for either MORE or LESS work than that shown on the drawings and called for in the specifications or included in the Base Bid. In the event of more or less units than so indicated or included, change orders may be issued for the increased or decreased amount.

ARTICLE 5. PREVAILING WAGE RATE

MISSOURI PREVAILING WAGE LAW (Sections 290.210 to 290.340, RSMo): The Contractor shall pay not less than the specified hourly rate of wages, as set out in the wage order attached to and made part of the specifications for work under this contract, to all workers performing work under the contract, in accordance with sections 290.210 to 290.340, RSMo. The Contractor shall forfeit a penalty to the Owner of one hundred dollars per day (or portion of a day) for each worker that is paid less than the specified rates for any work done under the contract by the Contractor or by any subcontractor, in accordance with section 290.250, RSMo.

DAVIS-BACON ACT: If this Project is financed in whole or in part from Federal funds (as indicated in the Instructions to Bidders or other bid or contract documents for this Project), then this contract shall be subject to all applicable federal labor statutes, rules and regulations, including provisions of the Davis-Bacon Act, 40 U.S.C. §3141 et seq., and the "Federal Labor Standards Provisions," as further set forth in Section 007333 – Supplementary General Conditions for Federally Funded/Assisted Construction Projects, which is incorporated into the contract by reference. Where the Missouri Prevailing Wage Law and the Davis-Bacon Act require payment of different wages for work performed under this contract, the Contractor and all Subcontractors shall pay the greater of the wages required under either law, on a classification-by-classification basis.

ARTICLE 6. MINORITY/WOMEN/SERVICE DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION

The Contractor has been granted a waiver of the 0% MBE, 0% WBE, and 3% SDVE or HDVE 3% participation goals. The Contractor agrees to secure the MBE/WBE/SDVE/HDVE participation amounts for this project as follows: (OR)

The Contractor has met the MBE/WBE/SDVE/HDVE participation goals and agrees to secure the MBE/WBE/SDVE/HDVE participation amounts for this project as follows:

MBE/WBE/SDVE/HDVE Firm: Subcontract Amt:$
MBE/WBE/SDVE/HDVE Firm: Subcontract Amt:$
MBE/WBE/SDVE/HDVE Firm: Subcontract Amt:$
Total $

MBE/WBE/SDVE/HDVE assignments identified above shall not be changed without a contract change signed by the Owner.

The Director of the Division of Facilities Management, Design and Construction or his Designee shall be the final authority to resolve disputes and disagreements between the Contractor and the MBE/WBE/SDVE/HDVE firms listed above when such disputes impact the subcontract amounts shown above.

SAMPLE

ARTICLE 7. CONTRACT DOCUMENTS

The following documents are hereby incorporated into this contract by reference (all division/section numbers and titles are as utilized in the Project Manual published by the Owner for this Project):

1. Division 0 – Procurement and Contracting Information, including, but not limited to:
    a. Invitation for Bid (Section 001116)
    b. Instructions to Bidders (Section 002113)
    c. Supplementary Instructions to Bidders (if applicable) (Section 002213)
    d. The following documents as completed and executed by the Contractor and accepted by the Owner, if applicable:
        i. Bid Form (Section 004113)
        ii. MBE, WBE, SDVE, HDVE Compliance Evaluation Form(s) (Section 004337)
        iii. MBE, WBE, SDVE, HDVE Eligibility Determination Form for Joint Ventures (Section 004338)
        iv. MBE, WBE, SDVE, HDVE Good Faith Effort (GFE) Determination Form (Section 004339)
        v. Missouri Service-Disabled Veteran Business Form (Section 004340)
        vi. Missouri Honorably Discharged Veteran Business Form (Section 004340.1)
        vii. Affidavit of Work Authorization (Section 004541)
    e. Performance and Payment Bond, completed and executed by the Contractor and surety (Section 006113)
    f. General Conditions (Section 007213)
    g. Supplementary Conditions (Section 007300)
    h. Supplementary General Conditions for Federally Funded/Assisted Construction Projects (Section 007333), if applicable
    i. Wage Rate(s) (Section 007346)
2. Division 1 – General Requirements
3. All Drawings identified in the Project Manual
4. All Technical Specifications included in the Project Manual
5. Addenda, if applicable

ARTICLE 8 – CERTIFICATION

By signing this contract, the Contractor hereby re-certifies compliance with all legal requirements set forth in Section 6.0, Bidder's Certifications of the Bid Form.

By signature below, the parties hereby execute this contract document.

APPROVED:

_____
Crystal Wessing, Director
Division of Facilities Management,
Design and Construction

_____
Contractor's Authorized Signature

I, Corporate Secretary, certify that I am Secretary of the corporation named above and that (CONTRACTOR NAME), who signed said contract on behalf of the corporation, was then (TITLE) of said corporation and that said contract was duly signed for and in behalf of the corporation by authority of its governing body, and is within the scope of its corporate powers.

_____
Corporate Secretary

SAMPLE

Bond No._____

SECTION 006113 - PERFORMANCE AND PAYMENT BOND FORM

KNOW ALL MEN BY THESE PRESENTS, THAT we _____

as principal, and _____

_____as Surety, are held and firmly bound unto the

STATE OF MISSOURI. in the sum of _____ Dollars ($)

for payment whereof the Principal and Surety bind themselves, their heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

WHEREAS, the Principal has, by means of a written agreement dated the _____

day of_____, 20_____, enter into a contract with the State of Missouri for

_____

_____

_____

(Insert Project Title and Number)

NOW, THEREFORE, if the Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original term of said contract and any extensions thereof that may be granted by the State of Missouri, with or without notice to the Surety and during the life of any guaranty required under the contract; and shall also faithfully perform and fulfill all undertakings, covenants, terms, conditions and agreements of any and all duly authorized modifications of said contract that may hereafter be made with or without notice to the Surety; and shall also promptly make payment for materials incorporated, consumed or used in connection with the work set forth in the contract referred to above, and all insurance premiums, both compensation and all other kinds of insurance, on said work, and for all labor performed on such work, whether by subcontractor or otherwise, at not less than the prevailing hourly rate of wages for work of a similar character (exclusive of maintenance work) in the locality in which the work is performed and not less than the prevailing hourly rate of wages for legal holiday and overtime work (exclusive of maintenance work) in the locality in which the work is performed both as determined by the Department of Labor and Industrial Relations or determined by the Court of Appeal, as provided for in said contract and in any and all duly authorized modifications of said contract that may be hereafter made, with or without notice to the Surety, then, this obligation shall be void and of no effect, but it is expressly understood that if the Principal should make default in or should fail to strictly, faithfully and efficiently do, perform and comply with any or more of the covenants, agreements, stipulations, conditions, requirements or undertakings, as specified in or by the terms of said contract, and with the time therein named, then this obligation shall be valid and binding upon each of the parties hereto and this bond shall remain in full force and effect; and the same may be sued on at the instance of any material man, laborer, mechanic, subcontractor, individual, or otherwise to whom such payment is due, in the name of the State of Missouri, to the use of any such person.

AND, IT IS FURTHER specifically provided that any modifications which may hereinafter be made in the terms of the contract or in the work to be done under it or the giving by the Owner of any extension of the time for the performance of the contract or any other forbearance on the part of either the Owner or the Principal to the other, shall not in any way release the Principal and the Surety, or either or any of them, their heirs, executors, administrators and successors, from their liability hereunder, notice to the Surety of any such extension, modifications or forbearance being hereby waived.

IN WITNESS WHEREOF, the above bounden parties have executed the within instrument this _____ day of _____, 20 ____.

AS APPLICABLE:

AN INDIVIDUAL

Name: _____

Signature: _____

A PARTNERSHIP

Name of Partner: _____

Signature of Partner: _____

Name of Partner: _____

Signature of Partner: _____

CORPORATION

Firm Name: _____

Signature of President: _____

SURETY

Surety Name: _____

Attorney-in-Fact: _____

Address of Attorney-in-Fact: _____

_____

Telephone Number of Attorney-in-Fact: _____

Signature Attorney-in-Fact: _____

NOTE: Surety shall attach Power of Attorney

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

PRODUCT SUBSTITUTION REQUEST

PROJECT NUMBER

PROJECT TITLE AND LOCATION

CHECK APPROPRIATE BOX

☐ SUBSTITUTION PRIOR TO BID OPENING
(Minimum of (5) working days prior to receipt of Bids as per Article 4 – Instructions to Bidders)

☐ SUBSTITUTION FOLLOWING AWARD
(Maximum of (20) working days from Notice to Proceed as per Article 3 – General Conditions)

FROM: BIDDER/CONTRACTOR (PRINT COMPANY NAME)

TO: ARCHITECT/ENGINEER (PRINT COMPANY NAME)

Bidder/Contractor hereby requests acceptance of the following product or systems as a substitution in accordance with provisions of Division One of the Bidding Documents:

SPECIFIED PRODUCT OR SYSTEM

SPECIFICATION SECTION NO.

SUPPORTING DATA

☐ Product data for proposed substitution is attached (include description of product, standards, performance, and test data)

☐ Sample ☐ Sample will be sent, if requested

QUALITY COMPARISON

	SPECIFIED PRODUCT	SUBSTITUTION REQUEST
NAME, BRAND		
CATALOG NO.		
MANUFACTURER		
VENDOR		

PREVIOUS INSTALLATIONS

PROJECT	ARCHITECT/ENGINEER	
LOCATION		DATE INSTALLED

SIGNIFICANT VARIATIONS FROM SPECIFIED PRODUCT

REASON FOR SUBSTITUTION

DOES PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK?

☐ YES ☐ NO

IF YES, EXPLAIN

SUBSTITUTION REQUIRES DIMENSIONAL REVISION OR REDESIGN OF STRUCTURE OR A/E WORK

☐ YES ☐ NO

BIDDER'S/CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENT:

We have investigated the proposed substitution. We believe that it is equal or superior in all respects to specified product, except as stated above; that it will provide the same Warranty as specified product; that we have included complete implications of the substitution; that we will pay redesign and other costs caused by the substitution which subsequently become apparent; and that we will pay costs to modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning as a result of the substitution.

BIDDER/CONTRACTOR	DATE

REVIEW AND ACTION

☐ Resubmit Substitution Request with the following additional information:

☐ Substitution is accepted.

☐ Substitution is accepted with the following comments:

☐ Substitution is not accepted.

ARCHITECT/ENGINEER	DATE

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION

FINAL RECEIPT OF PAYMENT AND RELEASE

PROJECT NUMBER

KNOW ALL MEN BY THESE PRESENT THAT: hereinafter called "Subcontractor" who heretofore entered into an agreement with hereinafter called "Contractor", for the performance of work and/or furnishing of material for the construction of the project entitled

(PROJECT TITLE, PROJECT LOCATION, AND PROJECT NUMBER)

at

(ADDRESS OF PROJECT)

for the State of Missouri (Owner) which said subcontract is by this reference incorporated herein, in consideration of such final payment by Contractor.

DOES HEREBY:

1. ACKNOWLEDGE that they have been **PAID IN FULL** all sums due for work and materials contracted or done by their Subcontractors, Material Vendors, Equipment and Fixture Suppliers, Agents and Employees, or otherwise in the performance of the Work called for by the aforesaid Contract and all modifications or extras or additions thereto, for the construction of said project or otherwise.
2. RELEASE and fully, finally, and forever discharge the Owner from any and all suits, actions, claims, and demands for payment for work performed or materials supplied by Subcontractor in accordance with the requirements of the above referenced Contract.
1. REPRESENT that all of their Employees, Subcontractors, Material Vendors, Equipment and Fixture Suppliers, and everyone else has been **paid in full** all sums due them, or any of them, in connection with performance of said Work, or anything done or omitted by them, or any of them in connection with the construction of said improvements, or otherwise.

DATED this day of , 20 .

NAME OF SUBCONTRACTOR

BY (TYPED OR PRINTED NAME)

SIGNATURE

TITLE

ORIGINAL: FILE/Closeout Documents

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT,
DESIGN AND CONSTRUCTION

PAY APP NO.	PROJECT NUMBER
CHECK IF FINAL ☐**FINAL**	DATE

MBE/WBE/SDVE/HDVE PROGRESS REPORT

Remit with **ALL** Progress and Final Payments

(Please check appropriate box) ☐CONSULTANT ☐CONSTRUCTION

PROJECT TITLE	
PROJECT LOCATION	
FIRM	
ORIGINAL CONTRACT SUM (Same as Line Item 1. on Form A of Application for Payment) **$**	TOTAL CONTRACT SUM TO DATE (Same as Line Item 3. on Form A of Application for Payment) **$**

THE TOTAL MBE/WBE/SDVE/HDVE PARTICIPATION DOLLAR AMOUNT OF THIS PROJECT AS INDICATED IN THE ORIGINAL CONTRACT: **$**

SELECT MBE, WBE, SDVE, HDVE	ORIGINAL CONTRACT PARTICIPATION AMOUNT	PARTICIPATION AMOUNT PAID-TO-DATE (includes approved contract changes)	CONSULTANT/SUBCONSULTANT OR CONTRACTOR/SUBCONTRACTOR/SUPPLIER COMPANY NAME
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	
☐ MBE ☐ WBE ☐ SDVE ☐ HDVE	$	$	

INSTRUCTIONS FOR MBE/WBE/SDVE/HDVE PROGRESS REPORT

CONTRACTOR OR CONSULTANT TO FILL OUT AND REMIT WITH EACH PAY APPLICATION:

The MBE/WBE/SDVE/HDVE Progress Report for the project is issued with the contract comprising values reported in the consultant's Proposal or on the successful contractor's Section 004337 Compliance Evaluation Forms.

At Initial Pay Application fill in the following:

1. Pay App No. Start with 1.
2. Fill in the Project Number and Date.
3. Enter Project Title, Project Location, and Firm.
4. Fill in the "Original Contract Sum" and "Total Contract Sum To Date" (Reference applicable Line Items on Form A of Application for Payment).
5. Indicate the Total Participation Dollar Amount from the Original Contract.
6. Select MBE, WBE, SDVE, or HDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier.
7. Enter the "Total Amount of Subcontract", "$ Amount (Paid-To-Date)", and Company Name.

For all subsequent Pay Applications fill in the following:

1. Pay App No.
2. If Final Pay App, check box.
3. Fill in the Project Number and Date.
4. Enter Project Title, Project Location, and Firm
5. At each Pay App fill in the "Original Contract Sum" and "Total Contract Sum To Date" (reference applicable Line Items on Form A of Application for Payment).
6. Indicate the Total Participation Dollar Amount from the Original Contract.
7. Select MBE, WBE, SDVE, or HDVE for each Consultant/Subconsultant or Contractor/Subcontractor/Supplier
8. Enter the "Total Amount of Subcontract", "$ Amount (Paid-To-Date)", and Company Name.

STATE OF MISSOURI
OFFICE OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT, DESIGN AND CONSTRUCTION
AFFIDAVIT – COMPLIANCE WITH PREVAILING WAGE LAW

PROJECT NUMBER

Before me, the undersigned Notary Public, in and for the County of _____

State of _____ personally came and appeared _____
(NAME)

_____ of the _____
(POSITION) (NAME OF THE COMPANY)

(a corporation) (a partnership) (a proprietorship) and after being duly sworn did depose and say that all provisions and requirements set out in Chapter 290, Sections 290.210 through and including 290.340, Missouri Revised Statutes, pertaining to the payment of wages to workmen employed on public works project have been fully satisfied and there has been no exception to the full and completed compliance with said provisions and requirements and with Wage Determination No: _____ issued by the Department of Labor and Industrial Relations, State of Missouri on the _____ day of _____ 20 __ in carrying out the contract and working in connection with _____
(NAME OF PROJECT)

Located at _____ in _____ County
(NAME OF THE INSTITUTION)

Missouri, and completed on the _____ day of _____ 20 __

SIGNATURE

NOTARY INFORMATION

NOTARY PUBLIC EMBOSSER OR BLACK INK RUBBER STAMP SEAL	STATE		COUNTY (OR CITY OF ST. LOUIS)
	SUBSCRIBED AND SWORN BEFORE ME, THIS DAY OF YEAR		**USE RUBBER STAMP IN CLEAR AREA BELOW**
	NOTARY PUBLIC SIGNATURE	MY COMMISSION EXPIRES	
	NOTARY PUBLIC NAME (TYPED OR PRINTED)		

FILE: Closeout Documents

GENERAL CONDITIONS

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ARTICLE:

1. General Provisions

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1.3. Compliance with Laws, Permits, Regulations and Inspections

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3.4. Guaranty and Warranties

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5. Construction and Completion

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5.4. Payments

6. Bond and Insurance

6.1. Bond

6.2. Insurance

7. Termination or Suspension of Contract

7.1. For Site Conditions

7.2. For Cause

7.3. For Convenience

A. These General Conditions apply to each section of these specifications. The Contractor is subject to the provisions contained herein.

B. The General Conditions are intended to define the relationship of the Owner, the Designer and the Contractor thereby establishing certain rules and provisions governing the operation and performance of the work so that the work may be performed in a safe, orderly, expeditious and workmanlike manner.

ARTICLE 1 – GENERAL PROVISIONS

ARTICLE 1.1 - DEFINITIONS

As used in these contract documents, the following terms shall have the meanings and refer to the parties designated in these definitions.

1. **"COMMISSIONER":** The Commissioner of the Office of Administration.
2. **"CONSTRUCTION DOCUMENTS":** The "Construction Documents" shall consist of the Project Manual, Drawings and Addenda.
3. **"CONSTRUCTION REPRESENTATIVE:"** Whenever the term "Construction Representative" is used, it shall mean the Owner's Representative at the work site.
4. **"CONTRACTOR"**: Party or parties who have entered into a contract with the Owner to furnish work under these specifications and drawings.
5. **"DESIGNER"**: When the term "Designer" is used herein, it shall refer to the Architect, Engineer, or Consultant of Record specified and defined in Paragraph 2.0 of the Supplemental Conditions, or his duly authorized representative. The Designer may be either a consultant or state employee.
6. **"DIRECTOR"**: Whenever the term "Director" is used, it shall mean the Director of the Division of Facilities Management, Design and Construction or his Designee, representing the Office of Administration, State of Missouri. The Director is the agent of the Owner.
7. **"DIVISION":** Shall mean the Division of Facilities Management, Design and Construction, State of Missouri.
8. **"INCIDENTAL JOB BURDENS":** Shall mean those expenses relating to the cost of work, incurred either in the home office or on the job-site, which are necessary in the course of doing business but are incidental to the job. Such costs include office supplies and equipment, postage, courier services, telephone expenses including long distance, water and ice and other similar expenses.
9. **"JOINT VENTURE"**: An association of two (2) or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge.
10. **"OWNER"**: Whenever the term "Owner" is used, it shall mean the State of Missouri. Acting by and through the Office of Administration, Division of Facilities Management, Design and Construction.
11. **"PROJECT"**: Wherever the term "Project" is used, it shall mean the work required to be completed by the construction contract.
12. **"PROJECT MANUAL"**: The "Project Manual" shall consist of Introductory Information, Invitation for Bid, Instructions to Bidders, Bid Documents, Additional Information, Standard Forms, General Conditions, Supplemental General Conditions, General Requirements and Technical Specifications.
13. **"SUBCONTRACTOR"**: Party or parties who contract under, or for the performance of part or this entire Contract between the Owner and Contractor. The subcontract may or may not be direct with the Contractor.
14. **"WORK"**: All supervision, labor, materials, tools, supplies, equipment, and any incidental operations and/or activities required by or reasonably inferable from the Contract Documents necessary to construct the Project and to produce the results intended by the Contract Documents in a safe, expeditious, orderly, and workmanlike manner so that the project shall be complete and finished in the best manner known to each respective trade.
15. "**WORKING DAYS**": are all calendar days except Saturdays, Sundays and the following holidays: New Year's Day, Martin Luther King, Jr. Day, Lincoln Day, Washington's Birthday (observed), Truman Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Columbus Day, Veterans Day (observed), Thanksgiving Day, Christmas Day.

ARTICLE 1.2 DRAWINGS AND SPECIFICATIONS

A. In case of discrepancy between drawings and specifications, specifications shall govern. Should discrepancies in architectural drawings, structural drawings and mechanical drawings occur, architectural drawings shall govern and, in case of conflict between structural and mechanical drawings, structural drawings shall govern.

B. Specifications are separated into titled divisions for convenience of reference only and to facilitate letting of contracts and subcontracts. The Contractor is responsible for establishing the scope of work for subcontractors, which may cross titled divisions. Neither the Owner nor Designer will establish limits and jurisdiction of subcontracts.

C. Figured dimensions take precedence over scaled measurements and details over smaller scale general drawings. In the event of conflict between any of the documents contained within the contract, the documents shall take precedence and be controlling in the following sequence: addenda, supplementary general conditions, general conditions, division 1 specifications, technical division specifications, drawings, bid form and instructions to bidders.

D. Anything shown on drawings and not mentioned in these specifications or vice versa, as well as any incidental work which is obviously necessary to complete the project within the limits established by the drawings and specifications, although not shown on or described therein, shall be performed by the Contractor at no additional cost as a part of his contract.

E. Upon encountering conditions differing materially from those indicated in the contract documents, the Contractor shall promptly notify the Designer and Construction Representative in writing before such conditions are disturbed. The Designer shall promptly investigate said conditions and report to the Owner, with a recommended course of action**.** If conditions do materially differ and cause an increase or decrease in contract cost or time required for completion of any portion of the work, a contract change will be initiated as outlined in Article 4 of these General Conditions.

E. Only work included in the contract documents is authorized, and the Contractor shall do no work other than that described therein or in accordance with appropriately authorized and approved contract changes.

ARTICLE 1.3 - COMPLIANCE WITH LAWS, PERMITS, REGULATIONS AND INSPECTIONS

A. Since the Owner is the State of Missouri, municipal or political subdivisions, zoning ordinances, construction codes (other than licensing of trades), and other like ordinances are not applicable to construction on Owner's property, and Contractor will not be required to submit drawings and specifications to any municipal or political subdivision, authority, obtain construction permits or any other licenses (other than licensing of trades) or permits from or submit to inspections by any municipality or political subdivision relating to the construction for this project. All permits or licenses required by municipality or political subdivision for operation on property not belonging to Owner shall be obtained by and paid for by Contractor. Each Contractor shall comply with all applicable laws, ordinances, rules and regulations that pertain to the work of this contract.

B. Contractors, subcontractors and their employees engaged in the businesses of electrical, mechanical, plumbing, carpentry, sprinkler system work, and other construction related trades shall be licensed to perform such work by the municipal or political subdivision where the project is located, if such licensure is required by local code. Local codes shall dictate the level (master, journeyman, and apprentice) and the number, type and ratio of licensed tradesmen required for this project within the jurisdiction of such municipal or political subdivision.

C. Equipment and controls manufacturers and their authorized service and installation technicians that do not maintain an office within the jurisdiction of the municipal or political subdivision but are a listed or specified contractor or subcontractor on this project are exempt from Paragraph 1.3 B above.

D. The Contractor shall post a copy of the wage determination issued for the project and included as a part of the contract documents, in a prominent and easily accessible location at the site of construction for the duration of the project.

E. Any contractor or subcontractor to such contractor at any tier signing a contract to work on this project shall provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for their on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. The contractor shall forfeit as a penalty to the public body on whose

behalf the contract is made or awarded, two thousand five hundred dollars plus one hundred dollars for each employee employed by the contractor or subcontractor, for each calendar day, or portion thereof, such employee is employed without the required training.

ARTICLE 1.4 - NONDISCRIMINATION IN EMPLOYMENT

A. The Contractor and his subcontractors will not discriminate against individuals based on race, color, religion, national origin, sex, disability, or age, but may use restrictions which relate to bona fide occupational qualifications. Specifically, the Contractor and his subcontractors shall not discriminate:

1. Against recipients of service on the basis of race, color, religion, national origin, sex, disability or age.
2. Against any employee or applicant, for employment on the basis of race, color, religion, national origin, sex or otherwise qualified disability status.
3. Against any applicant for employment or employee on the basis of age, where such applicant or employee is between ages 40 and 70 and where such Contractor employs at least 20 persons.
4. Against any applicant for employment or employee on the basis of that person's status as a disabled or Vietnam-era veteran.

The Contractor and his Subcontractors will ensure applicants for employment and employees are treated equally without regard to race, color, religion, national origin, sex, disability, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion and transfer; recruitment or recruitment advertising; and selection for training, including apprenticeship. The Contractor and his Subcontractors will give written notice of their commitments under this clause to any labor union with which they have bargaining or other agreements under this clause to any labor union with which they have bargaining or other agreements.

B. In the event of the Contractor's or his subcontractor's noncompliance with any provisions of this Article of the Contract, the Owner may cancel this contract in whole or in part or require the Contractor to terminate his contract with the subcontractor.

ARTICLE 1.5 - ANTI-KICKBACK

No employee of the division, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract or in any part hereof. No officer, employee, designer, attorney, or administrator of or for the Owner who is authorized in such capacity and on behalf of the Owner to exercise any legislative, executive, supervisory or other similar functions in connection with the construction of the project, shall have or acquire any pecuniary interest, whether direct or indirect, in this contract, any material supply contract, subcontract, insurance contract, or any other contract pertaining to the project.

ARTICLE 1.6 - PATENTS AND ROYALTIES

A. The Contractor shall hold and save the Owner and its officers, agents, servants, and employees harmless from liabilities of any nature or kind, including cost and expenses, for, or on account of, any patented or unpatented invention, process, article or appliance manufactured or used in the performance of this contract, including its use by the Owner, unless otherwise specifically stipulated in the contract documents.

B. If the Contractor uses any design, device or materials covered by letters, patent or copyright, the Contractor shall provide for such use by suitable agreement with the Owner of such patented or copyrighted design, device or material. It is mutually agreed and understood, without exception, that the contract prices shall include all royalties or costs arising from the use of such design, device or materials, in any way involved in the work. The Contractor and/or his sureties shall indemnify and save harmless the Owner of the project from any and all claims for infringement by reason of the use of such patented or copyrighted design, device or materials or any trademark or copyright in connection with work agreed to be performed under this contract and shall indemnify the Owner for any cost, expense or damage it may be obliged to pay by reason of such infringement at any time during the prosecution of the work or after completion of the work.

ARTICLE 1.7 - PREFERENCE FOR AMERICAN AND MISSOURI PRODUCTS AND SERVICES

A. By virtue of statutory authority a preference will be given to Missouri labor and to products of mines, forests and quarries of the state of Missouri when they are found in marketable quantities in the state, and all such materials shall be of the best quality and suitable character that can be obtained at reasonable market prices, all as provided for in Section 8.280, Missouri Revised Statutes and Cumulative Supplements.

B. Furthermore, pursuant to Section 34.076 Missouri Revised Statutes and Cumulative Supplements, a preference shall be given to those persons doing business as Missouri firms, corporations, or individuals, or which maintain Missouri offices or places of business, when the quality of performance promised is equal or better and the price quoted is the same or less. In addition, in order for a non-domiciliary bidder to be successful, his bid must be that same percentage lower than a domiciliary Missouri bidder's bid, as would be required for a Missouri bidder to successfully bid in the non-domiciliary state.

C In accordance with the Missouri Domestic Products Procurement Act Section 34.350 RSMo and Cumulative Supplements any manufactured goods or commodities used or supplied in the performance of this contract or any subcontract thereto shall be manufactured, assembled or produced in the United States, unless the specified products are not manufactured, assembled or produced in the United States in sufficient quantities to meet the agency's requirements or cannot be manufactured, assembled or produced in the United States within the necessary time in sufficient quantities to meet the contract requirements, or if obtaining the specified products manufactured, assembled or produced in the United States would increase the cost of this contract for purchase of the product by more than ten percent.

ARTICLE 1.8 - COMMUNICATIONS

A. All notices, requests, instructions, approvals, and claims must be in writing and shall be delivered to the Designer and copied to the Construction Representative for the project except as required by Article 1.12 Disputes and Disagreements, or as otherwise specified by the Owner in writing as stated in Section 012600. Any such notice shall be deemed to have been given as of the time of actual receipt.

B. The Contractor shall attend on-site progress and coordination meetings, as scheduled by the Construction Representative, no less than once a month.

C. The Contractor shall ensure that major subcontractors and suppliers shall attend monthly progress meetings as necessary to coordinate the work, and as specifically requested by the Construction Representative.

ARTICLE 1.9 - SEPARATE CONTRACTS AND COOPERATION

A. The Owner reserves the right to let other contracts in connection with this work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs.

B. The Contractor shall consult the drawings for all other contractors in connection with this work. Any work conflicting with the above shall be brought to the attention of the Owner’s Representative before the work is performed. If the Contractor fails to do this, and constructs any work which interferes with the work of another contractor, the Contractor shall remove any part so conflicting and rebuild same, as directed by the Owner’s Representative at no additional cost to the Owner.

C. Each contractor shall be required to coordinate his work with other contractors so as to afford others reasonable opportunity for execution of their work. No contractor shall delay any other contractor by neglecting to perform contract work at the proper time. If any contractor causes delay to another, they shall be liable directly to that contractor for such delay in addition to any liquidated damages which might be due the Owner.

D. Should the Contractor or project associated subcontractors refuse to cooperate with the instructions and reasonable requests of other Contractors or other subcontractors in the overall coordinating of the work, the Owner may take such appropriate action and issue directions, as required, to avoid unnecessary and unwarranted delays.

E. Each Contractor shall be responsible for damage done to Owner's or other Contractor's property by him/her or workers in his employ through their fault or negligence.

F. Should a Contractor sustain any damage through any act or omission of any other Contractor having a contract with the Owner, the Contractor so damaged shall have no claim or cause of action against the Owner for such damage, but shall have a claim or cause of action against the other Contractor to recover any and all damages sustained by reason of the acts or omissions of such Contractor. The phrase "acts or omissions" as used in this section shall be defined to include, but

not be limited to, any unreasonable delay on the part of any such contractors.

ARTICLE 1.10 - ASSIGNMENT OF CONTRACT

A. No assignment by Contractor of any amount or any part of this contract or of the funds to be received there under will be recognized unless such assignment has had the written approval of the Director and the surety has been given due notice of such assignment and has furnished written consent thereto. In addition to the usual recitals in assignment contracts, the following language must be set forth: "It is agreed that the funds to be paid to the assignee under this assignment are subject to performance by the Contractor of this contract and to claims or liens for services rendered or materials supplied for the performance of the work called for in said contract in favor of all persons, firms or corporations rendering such services or supplying such materials."

ARTICLE 1.11 - INDEMNIFICATION

A. Contractor agrees to indemnify and save harmless Owner and its respective commissioners, officers, officials, agents, consultants and employees and Designer, their agents, servants and employees, from and against any and all liability for damage arising from injuries to persons or damage to property occasioned by any acts or omissions of Contractor, any subcontractors, agents, servants or employees, including any and all expense, legal or otherwise, which may be incurred by Owner or Designer, its agents, servants or employees, in defense of any claim, action or suit.

B. The obligations of the Contractor under this paragraph shall not extend to the liability of the Designer, his agents or employees, arising out of (1) the preparation or approval of maps, drawings, opinions, reports, surveys, contract changes, design or specifications, or (2) giving of or the failure to give directions or instructions by the Designer, his agents or employees as required by this contract documents provided such giving or failure to give is the primary cause of the injury or damage.

ARTICLE 1.12 - DISPUTES AND DISAGREEMENTS

It is hereby expressly agreed and understood that in case any controversy or difference of opinion arises during construction, best efforts will be given to resolution at the field level. Should those efforts be unsuccessful, the Contractor has the right to appeal in writing, the decision of the Director's Designee to the Director at Room 730 Truman Building, P.O. Box 809, Jefferson City, Missouri 65102. The decision of the Director shall be final and binding on all parties.

ARTICLE 2 -- OWNER/DESIGNER RESPONSIBILITIES

A. The Owner shall give all orders and directions contemplated under this contract relative to the execution of the work. During progress of work the Owner will be represented at the project site by the Construction Representative and/or Designer, whose responsibilities are to see that this contract is properly fulfilled.

B. The Owner shall at all times have access to the work whenever it is in preparation or progress. The Contractors shall provide proper facilities for such access and for inspection and supervision.

C. All materials and workmanship used in the work shall be subject to the inspection of the Designer and Construction Representative, and any work which is deemed defective shall be removed, rebuilt or made good immediately upon notice. The cost of such correction shall be borne by the Contractor. Contractor shall not be entitled to an extension of the contract completion date in order to remedy defective work. All rejected materials shall be immediately removed from the site of the work.

D. If the Contractor fails to proceed at once with the correction of rejected defective materials or workmanship, the Owner may, by separate contract or otherwise, have the defects remedied or rejected. Materials removed from the site and charge the cost of the same against any monies which may be due the Contractor, without prejudice to any other rights or remedies of the Owner.

E. Failure or neglect on the part of Owner to observe faulty work, or work done which is not in accordance with the drawings and specifications shall not relieve the Contractor from responsibility for correcting such work without additional compensation.

F. The Owner shall have the right to direct the Contractor to uncover any completed work.

1. If the Contractor fails to adequately notify the Construction Representative and/or Designer of an inspection as required by the Contract Documents, the Contractor shall, upon written request, uncover the work. The Contractor shall bear all costs associated with uncovering and again covering the work exposed.

2. If the Contractor is directed to uncover work, which was not otherwise required by the Contract Documents to be inspected, and the work is found to be defective in any respect, no compensation shall be allowed for this work. If, however, such work is found to meet

the requirements of this contract, the actual cost of labor and material necessarily involved in the examination and replacement plus 10% shall be allowed the Contractor.

G. The Designer shall give all orders and directions contemplated under this contract relative to the scope of the work and shall give the initial interpretation of the contract documents.

H. The Owner may file a written notice to the Contractor to dismiss immediately any subcontractors, project managers, superintendents, foremen, workers, watchmen or other employees whom the Owner may deem incompetent, careless or a hindrance to proper or timely execution of the work. The Contractor shall comply with such notice as promptly as practicable without detriment to the work or its progress.

I. If in the Owner's judgment it becomes necessary at any time to accelerate work, when ordered by the Owner in writing, the Contractor shall redirect resources to such work items and execute such portions of the work as may be required to complete the work within the current approved contract schedule.

ARTICLE 3 -- CONTRACTOR RESPONSIBILITIES

The Contractor shall register and utilize the Owner's eBuilder digital project management system for submission of documents described in the following sections. This includes but is not limited to submittals as required by designer, payment applications, Request for Information (RFI), construction change orders, Request for Proposals (RFP), Designer Supplemental Instructions (DSI), etc.

ARTICLE 3.1 -- ACCEPTABLE SUBSTITUTIONS

A. The Contractor may request use of any article, device, product, material, fixture, form or type of construction which in the judgment of the Owner and Designer is equal in all respects to that named. Standard products of manufacturers other than those specified will be accepted when, prior to the ordering or use thereof, it is proven to the satisfaction of the Owner and Designer that they are equal in design, strength, durability, usefulness and convenience for the purpose intended.

B. Any changes required in the details and dimensions indicated on the drawings for the substitution of products other than those specified shall be properly made at the expense of the Contractor requesting the substitution or change.

C. The Contractor shall submit a request for such substitutions in writing to the Owner and Designer within twenty (20) working days after the date of the "Notice to Proceed." Thereafter no consideration will be given to alternate forms of accomplishing the work. This Article does not preclude the Owner from exercising the provisions of Article 4 hereof.

D. Any request for substitution by the Contractor shall be submitted in accordance with SECTION 002113 - INSTRUCTIONS TO BIDDERS.

E. When a material has been approved, no change in brand or make will be permitted unless:

1. Written verification is received from the manufacturer stating they cannot make delivery on the date previously agreed, or
2. Material delivered fails to comply with contract requirements.

ARTICLE 3.2 -- SUBMITTALS

A. The Contractor's submittals must be submitted with such promptness as to allow for review and approval so as not to cause delay in the work. The Contractor shall coordinate preparation and processing of submittals with performance of construction activities.

Coordinate each submittal with fabrication, = purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

Submit four (4) copies to the Designer and additional copies as required for the subcontractors and material suppliers. Also provide copies to meet the requirements for maintenance manuals.

B. All subcontractors' shop drawings and schedules shall be submitted by the Contractor and shall bear evidence that Contractor has received, reviewed, and approved them. Any shop drawings and schedules submitted without this evidence will be returned to the Contractor for resubmission.

C. The Contractor shall include with the shop drawing, a letter indicating any and all deviations from the drawings and/or specifications. Failure to notify the Designer of such deviations will be grounds for subsequent rejection of the related work or materials. If, in the opinion of the Designer, the deviations are not acceptable, the Contractor will be required to furnish the item as specified and indicated on the drawings.

D. The Designer shall check shop drawings and schedules with reasonable promptness and approve them only if they conform to the design concept of the project and comply with the information given in the contract documents. The approval shall not relieve the Contractor from the responsibility to comply with the drawings and specifications, unless the Contractor has called the Designer's attention to the deviation, in writing, at the time of

submission and the Designer has knowingly approved thereof. An approval of any such modification will be given only under the following conditions:

1. It is in the best interest of the Owner
2. It does not increase the contract sum and/or completion time
3. It does not deviate from the design intent
4. It is without prejudice to any and all rights under the surety bond.

E. No extension of time will be granted because of the Contractor's failure to submit shop drawings and schedules in ample time to allow for review, possible resubmission, and approval. Fabrication of work shall not commence until the Contractor has received approval. The Contractor shall furnish prints of approved shop drawings and schedules to all subcontractors whose work is in any way related to the work under this contract. Only prints bearing this approval will be allowed on the site of construction

F. The Contractor shall maintain a complete file on-site of approved shop drawings available for use by the Construction Representative.

ARTICLE 3.3 – AS-BUILT DRAWINGS

A. The Contractor shall update a complete set of the construction drawings, shop drawings and schedules of all work monthly by marking changes, and at the completion of their work (prior to submission of request for final payment) note all changes and turn the set over to the Construction Representative. The updates shall show all addenda, all field changes that were made to adapt to field conditions, changes resulting from contract changes or supplemental instructions, and all locations of structures, buried installations of piping, conduit, and utility services. All buried and concealed items both inside and outside shall be accurately located as to depth and referenced to permanent features such as interior or exterior wall faces and dimensions shall be given in a neat and legible manner in a contrasting colored pencil or ink. If approved by the Designer, an electronic file format may be provided.

ARTICLE 3.4 – GUARANTY AND WARRANTIES

A. General Guaranty

1. Neither the final certificate of payment nor any provision in the contract documents nor partial use or occupancy of the premises by the Owner shall constitute an acceptance of work not done in accordance with contract requirements.
2. The Contractor or surety shall remedy any defects in the work and pay for any damage to property resulting there from which shall appear within a period of one (1) year from the date of substantial completion unless a longer period is otherwise specified or a differing guaranty period has been established in the substantial completion certificate. The Owner will give notice of observed defects with reasonable promptness.
3. In case of default on the part of the Contractor in fulfilling this part of this contract, the Owner may correct the work or repair the damage and the cost and expense incurred in such event shall be paid by or recoverable from the Contractor or surety.
4. The work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment

B. Extended Warranty

Manufacturer's certificates of warranty shall be obtained for all major equipment. Warranty shall be obtained for at least one year. Where a longer period is offered at no additional cost or called for in the specific equipment specifications, the longer period shall govern.

ARTICLE 3.5 -- OPERATION AND MAINTENANCE MANUALS

A. Immediately after equipment submittals are approved and no later than ten (10) working days prior to the substantial completion inspection, the Contractor shall provide to the Designer three (3) copies of operating instructions and service manuals, containing the following:

1. Start-up and Shut-down Procedures: Provide a step-by-step write up of all major equipment. When manufacturer’s printed start-up, trouble shooting and shut-down procedures are available; they may be incorporated into the operating manual for reference.

2. Operating Instructions: Written operating instructions shall be included for the efficient and safe operation of all equipment.

3. Equipment List: List of all major equipment as installed shall be prepared to include model number, capacities, flow rate, name place data, shop drawings and air and water balance reports.

4. Service Instructions: Provide the following information for all pieces of equipment.

   a. Recommended spare parts including catalog number and name of local supplier or factory representative.

   b. Belt sizes, types, and lengths.

   c. Wiring diagrams.

5. Manufacturer's Certificate of Warranty as described in Article 3.4.

6. Prior to the final payment, furnish to the Designer three (4) copies of parts catalogs for each piece of equipment furnished by him/her on the project with the components identified by number for replacement ordering.

B. Submission of operating instructions shall be done in the following manner.

1. Manuals shall be in quadruplicate, and all materials shall be bound into volumes of standard 8½" x 11" hard binders. Large drawings too bulky to be folded into 8½" x 11" shall be separately bound or folded and in envelopes, cross referenced and indexed with the manuals.

2. The manuals shall identify project name, project number, and include the name and address of the Contractor, subcontractors and manufacturers who were involved with the activity described in that particular manual.

3. Internally subdivide the binder contents with permanent page dividers, logically organized with tab titles clearly printed under reinforced laminated plastic tabs.

4. Contents: Prepare a Table of Contents for each volume, with each product or system description identified.

ARTICLE 3.6 – OTHER CONTRACTOR RESPONSIBILITIES

A. The Contractor shall keep on site, during progress of the work, a competent superintendent satisfactory to the Construction Representative. The superintendent shall represent the Contractor and all agreements made by the superintendent shall be binding. The superintendent shall carefully study and compare all drawings, specifications and other instructions and shall promptly notify the Construction Representative and Designer, in writing, any error, inconsistency or omission which may be discovered. The superintendent shall coordinate all work on the project. Any change of the superintendent shall be approved by the Construction Representative.

B. Contractor shall, at all times, enforce strict discipline and good order among his employees, and shall not employ on the work any unfit person or anyone not skilled in the work assigned to him/her.

C. The Contractor shall supply sufficient labor, material, plant and equipment and pay when due any laborer, subcontractor or supplier for supplies furnished and otherwise prosecute the work with diligence to prevent work stoppage and ensure completion thereof within the time specified.

D. The Contractor and each of his subcontractors shall submit to the Construction Representative, through the Designer such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as the Owner may request concerning work performed or to be performed under this contract.

E. The Contractor, subcontractors, and material suppliers shall upon written request, give the Owner access to all time cards, material invoices, payrolls, estimates, profit and loss statements, and all other direct or indirect costs related to this work.

F. The Contractor shall be responsible for laying out all contract work such as layout of architectural, structural, mechanical and electrical work, which shall be coordinated with layouts of subcontractors for general construction work. The Contractor is also responsible for unloading, uncrating and handling of all materials and equipment to be erected or placed by him/her, whether furnished by Contractor or others. No extra charges or compensation will be allowed as a result of failure to verify dimensions before ordering materials or fabricating items.

G. The Contractor must notify the Construction Representative at least one working day before placing concrete or burying underground utilities, pipelines, etc.

H. Contractors shall prearrange time with the Construction Representative for the interruption of any facility operation. Unless otherwise specified in these documents, all connections, alterations or relocations as well as all other portions of the work will be performed during normal working hours.

I. The Contractor shall coordinate all work so there will not be prolonged interruptions of existing equipment operation. Any existing plumbing, heating, ventilating, air conditioning or electrical disconnections necessary for the project, which affect portions of this construction or building or any other building must be scheduled with the Construction Representative to minimize or avoid any disruption of facility operations. In no case, unless previously approved in writing by the Construction Representative, shall utilities be left disconnected at the end of a work day or over a weekend. Any interruption of utilities either intentionally or accidentally shall not relieve the Contractor responsible for the interruption from the responsibility to repair and restore the utility to normal service. Repairs and restoration shall be made before the workers responsible for the repair and restoration leave the job.

J. Contractors shall limit operations and storage of materials to the area within the project, except as necessary to connect to existing utilities, and shall not encroach on neighboring property. The Contractor shall be responsible for repair of their damage to property on or off the project site occurring during construction of project. All such repairs shall be made to the satisfaction of the property owner.

K. Unless otherwise permitted, all materials shall be new and both workmanship and materials shall be of the best quality.

L. Unless otherwise provided and stipulated within these specifications, the Contractor shall furnish, construct, and/or install and pay for materials, devices, mechanisms, equipment, all necessary personnel, utilities including, but not limited to water, heat, light and electric power, transportation services, applicable taxes of every nature, and all other facilities necessary for the proper execution and completion of the work.

M. Contractor shall carefully examine the plans and drawings and shall be responsible for the proper fitting of his material, equipment and apparatus into the building.

N. The Contractor or subcontractors shall not overload, or permit others to overload, any part of any structure during the performance of this contract.

O. All temporary shoring, bracing, etc., required for the removal of existing work and/or for the installation of new work shall be included in this contract. The Contractor shall make good, at no cost to the Owner, any damage caused by improper support or failure of shoring in any respect. Each Contractor shall be responsible for shoring required to protect his work or adjacent property and improvements of Owner and shall be responsible for shoring or for giving written notice to adjacent property owners. Shoring shall be removed only after completion of permanent supports.

P. The Contractor shall provide at the proper time such material as is required for support of the work. If openings are required, whether shown on drawings or not, the Contractor shall see that they are properly constructed.

Q. During the performance of work the Contractor shall be responsible for providing and maintaining warning signs, lights, signal devices, barricades, guard rails, fences and other devices appropriately located on site which will give proper and understandable warning to all persons of danger of entry onto land, structure or equipment.

R. The Contractor shall be responsible for protection, including weather protection, and proper maintenance of all equipment and materials.

S. The Contractor shall be responsible for care of the finished work and shall protect same from damage or defacement until substantial completion by the Owner. If the work is damaged by any cause, the Contractor shall immediately begin to make repairs in accordance with the drawings and specifications. Contractor shall be liable for all damage or loss unless attributable to the acts or omissions of the Owner or Designer. Any claim for reimbursement shall be submitted in accordance with Article 4. After substantial completion the Contractor will only be responsible for damage resulting from acts or omissions of the Contractor or subcontractors through final warranty.

T. In the event the Contractor encounters an unforeseen hazardous material, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Designer in writing. The Contractor shall not be required, pursuant to Article 4, to perform, any work relating to hazardous materials.

U. In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 4.

V. Before commencing work, Contractors shall confer with the Construction Representative and facility representative and review any facility rules and regulations which may affect the conduct of the work.

W. Project signs will only be erected on major projects and only as described in the specifications. If no sign is specified, none shall be erected.

ARTICLE 3.7 -- SUBCONTRACTS

A. Subcontractor assignments as identified in the bid form shall not be changed without written approval of the Owner. The Owner will not approve changes of a listed subcontractor unless the Contractor documents, to the satisfaction of the Owner that the subcontractor cannot or will not perform the work as specified.

B. The Contractor is fully responsible to the Owner for the acts and omissions of all subcontractors and of persons either directly or indirectly employed by them.

C. Every subcontractor shall be bound by the applicable terms and provisions of these contract documents, but no contractual relationship shall exist between any subcontractor and the Owner unless the right of the Contractor to proceed with the work is suspended or this contract is terminated as herein provided, and the Owner in writing elects to assume the subcontract.

D. The Contractor shall upon receipt of "Notice to Proceed" and prior to submission of the first payment request, notify the Designer and Construction Representative in writing of the names of any subcontractors to be used in addition to those identified in the bid form and all major material suppliers proposed for all parts of the work.

ARTICLE 4 -- CHANGES IN THE WORK

4.1 CHANGES IN THE WORK

A. The Construction Representative, without giving notice to the surety and without invalidating this contract, may order extra work or make changes by altering, adding to or deducting from the work, this contract sum being adjusted accordingly. All such work shall be executed under the conditions of the original contract. A claim for extension of time caused by any change must be adjusted at the time of ordering such change. No future request for time will be considered.

B. Each Contract Change shall include all costs required to perform the work including all labor, material, equipment, overheads and profit, delay, disruptions, or other miscellaneous expenses. No subsequent requests for additional compensation including claims for delay, disruption, or reduced efficiency as a result of each change will be considered. Values from the Schedule of Values will not be binding as a basis for additions to or deductions from the contract price.

C. The amount of any adjustment in this contract price for authorized changes shall be agreed upon before such changes become effective and shall be determined, through submission of a request for proposal, as follows:

1. By an acceptable fixed price proposal from the Contractor. Breakdowns shall include all takeoff sheets of each Contractor and subcontractor. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.

2. By a cost-plus-fixed-fee (time and material) basis with maximum price, total cost not to exceed said maximum. Breakdown shall include a listing of each item of material with unit prices and number of hours of labor for each task. Labor costs per hour shall be included with labor burden identified, which shall be not less than the prevailing wage rate, etc. Overhead and profit shall be shown separately for each subcontractor and the Contractor.

3. By unit prices contained in Contractor's original bid form and incorporated in the construction contract.

D. Overhead and Profit on Contract Changes shall be applied as follows:

1. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: incidental job burdens, small truck (under 1 ton) expense, mileage, small hand tools, warranty costs, company benefits and general office overhead. Project supervision including field supervision and job site office expense shall be considered a part of overhead and profit unless a compensable time extension is granted.

2. The percentages for overhead and profit charged on Contract Changes shall be subject to the following limits: (a) the percentage mark-up for the Contractor shall be limited to the Contractor’s fee: (b) fifteen percent (15%) maximum for Work directly performed by employees of a subcontractor, or sub-subcontractor; (c) five percent (5%) maximum for the Work performed or passed through to the Owner by the Contractor; (d) five percent (5%) maximum subcontractor’s mark-up for

Work performed by a sub-subcontractor and passed through to the Owner by the subcontractor and Contractor; and (e) in no case shall the total overhead and profit paid by the Owner on any Contract Changes exceed twenty-five percent (25%) of the cost of materials, labor and equipment (exclusive of Contractor or any Subcontractor overhead and profit) necessary to put the contract change work in place.

3. The Contractor will be allowed to add the cost of Contractor's payment and performance bonding, builder's risk insurance, and general liability insurance to their cost of work. The above listed bonding and insurance cost shall not exceed two percent (2%) and shall be allowed on the total cost of the added work, including overhead and profit.

4. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work.

5. The percentage(s) for overhead and profit to be credited to the Owner on Contract Changes that are solely decreases in the quantity of work or materials shall be the same as those for additive Contract Changes provided above.

E. No claim for an addition to this contract sum shall be valid unless authorized as aforesaid in writing by the Owner. In the event that none of the foregoing methods are agreed upon, the Owner may order the Contractor to perform work on a time and material basis. The cost of such work shall be determined by the Contractor's actual labor and material cost to perform the work plus overhead and profit as outlined herein. The Designer and Construction Representative shall approve the Contractor's daily time and material invoices for the work involved.

F. If the Contractor claims that any instructions involve extra cost under this contract, the Contractor shall give the Owner's Representative written notice thereof within a reasonable time after the receipt of such instructions, and in any event before proceeding to execute the work. No such claim shall be valid unless so made and authorized by the Owner, in writing.

G. In an emergency affecting the safety of life or of the structure or of adjoining property, the Contractor, without special instruction or authorization from the Construction Representative, is hereby permitted to act at their discretion to prevent such threatened loss or injury. The Contractor shall submit a claim for compensation for such emergency work in writing to the Owner's Representative.

ARTICLE 4.2 – CHANGES IN COMPLETION TIME

A. Extension of the number of work days stipulated in the Contract for completion of the work with compensation may be made when:

1. The contractor documents that proposed Changes in the work, as provided in Article 4.1, extends construction activities critical to contract completion date, OR

2. The Owner suspends all work for convenience of the Owner as provided in Article 7.3, OR

3. An Owner caused delay extends construction activities critical to contract completion (except as provided elsewhere in these General Conditions). The Contractor is to review the work activities yet to begin and evaluate the possibility of rescheduling the work to minimize the overall project delay.

B. Extension of the number of work days stipulated in the Contract for completion of the work <u>without</u> compensation may be made when:

1. Weather-related delays occur, subject to provisions for the inclusion of a specified number of "bad weather" days when provided for in Section 012100-Allowances, OR

2. Labor strikes or acts of God occur, OR

3. The work of the Contractor is delayed on account of conditions which were beyond the control of the Contractor, subcontractors or suppliers, and were not the result of their fault or negligence.

C. No time extension or compensation will be provided for delays caused by or within the control of the Contractor, subcontractors or suppliers and for concurrent delays caused by the Owner.

D. The Contractor shall notify the Owner promptly of any occurrence or conditions which in the Contractor's opinion results in a need for an extension of time. The notice shall be in writing and shall include all necessary supporting materials with details of any resultant costs and be submitted in time to permit full investigation and evaluation of the Contractor's claim. The Owner shall promptly acknowledge the Contractor's notice and, after recommendation from the Owner's Representative and/or Designer, shall provide a decision to the Contractor. Failure on the part of the Contractor to provide such notice and to detail the costs shall constitute a waiver by the Contractor of any claim. Requests for extensions of time shall be for working days only.

ARTICLE 5 - CONSTRUCTION AND COMPLETION

ARTICLE 5.1 – CONSTRUCTION COMMENCEMENT

A. Upon receipt of the "Intent to Award" letter, the Contractor must submit the following properly executed instruments to the Owner:

1. Contract;
2. Performance/payment bond as described in Article 6.1;
3. Certificates of Insurance, or the actual policies themselves, showing that the Contractor has obtained the insurance coverage required by Article 6.2.

Above referenced items must be received by the Owner within ten (10) working days after the effective date of the contract. If not received, the Owner may treat the failure to timely submit them as a refusal by the Contractor to accept a contract for this work and may retain as liquidated damages the Contractor's bid bond, cashier's check or certified check as provided in the Instructions to Bidders. Upon receipt the Owner will issue a "Notice to Proceed" with the work to the Contractor.

B. Within the time frame noted in Section 013200 - Schedules, following receipt of the "Notice to Proceed", the Contractor shall submit to the Owner a progress schedule and schedule of values, showing activities through the end of the contract period. Should the Contractor not receive written notification from the Owner of the disapproval of the schedule of values within fifteen (15) working days, the Contractor may consider it approved for purpose of determining when the first monthly Application and Certification for Payment may be submitted.

C. The Contractor may commence work upon receipt of the Division of Facilities Management, Design and Construction's "Notice to Proceed" letter. Contractor shall prosecute the work with faithfulness and energy, and shall complete the entire work on or before the completion time stated in the contract documents or pay to the Owner the damages resulting from the failure to timely complete the work as set out within Article 5.4.

ARTICLE 5.2 -- PROJECT CONSTRUCTION

A. Each Contractor shall submit for the Owner's approval, in reproducible form, a progress schedule showing the rate of progress and the order of the work proposed to carry on various phases of the project. The schedule shall be in conformance with the requirements outlined in Section 013200 – Schedules.

B. Contractor shall employ and supply a sufficient force of workers, material, and equipment and shall pay when due, any worker, subcontractor or supplier and otherwise prosecute the work with such diligence so as to maintain the rate of progress indicated on the progress schedule, prevent work stoppage, and insure completion of the project within the time specified.

ARTICLE 5.3 -- PROJECT COMPLETION

A. Substantial Completion. A Project is substantially complete when construction is essentially complete and work items remaining to be completed can be done without interfering with the Owner's ability to use the Project for its intended purpose.

1. Once the Contractor has reached what they believe is Substantial Completion, the Contractor shall notify the Designer and the Construction Representative of the following:
   a. That work is essentially complete with the exception of certain listed work items. The list shall be referred to as the "Contractor's Punch."
   b. That all Operation and Maintenance Manuals have been assembled and submitted in accordance with Article 3.5A.
   c. That the Work is ready for inspection by the Designer and Construction Representative. The Owner shall be entitled to a minimum of ten working days notice before the inspection shall be performed.
2. If the work is acceptable, the Owner shall issue a Certificate of Substantial Completion, which shall set forth the responsibilities of the Owner and the Contractor for utilities, security, maintenance, damage to the work and risk of loss. The Certificate shall also identify those remaining items of work to be performed by the Contractor. All such work items shall be complete within 30 working days of the date of the Certificate, unless the Certificate specifies a different time. If the Contractor shall be required to perform tests that must be delayed due to climatic conditions, it is understood that such tests and affected equipment will be identified on the Certificate and shall be accomplished by the Contractor at the earliest possible date. Performance of the tests may not be required before Substantial Completion can be issued. The date of the issuance of the Certificate of

Substantial Completion shall determine whether or not the work was completed within the contract time and whether or not Liquidated Damages are due.

3. If the work is not acceptable, and the Owner does not issue a Certificate of Substantial Completion, the Owner shall be entitled to charge the Contractor with the Designer's and Owner's costs of re-inspection, including time and travel.

B. Partial Occupancy. Contractor agrees that the Owner shall be permitted to occupy and use any completed or partially completed portions of the Project, when such occupancy and use is in the Owner's best interest. Owner shall notify Contractor of its desire and intention to take Partial Occupancy as soon as possible but at least ten (10) working days before the Owner intends to occupy. If the Contractor believes that the portion of the work the Owner intends to occupy is not ready for occupancy, the Contractor shall notify the Owner immediately. The Designer shall inspect the work in accordance with the procedures above. If the Contractor claims increased cost of the project or delay in completion as a result of the occupancy, he shall notify the Owner immediately but in all cases before occupancy occurs.

C. Final Completion. The Project is finally complete when the Certificate of Substantial Completion has been issued and all work items identified therein as incomplete have been completed, and when all administrative items required by the contract have been completed. Final Completion entitles the Contractor to payment of the outstanding balance of the contract amount including all change orders and retainage. Within five (5) working days of the date of the Certificate of Substantial Completion, the Contractor shall identify the cost to complete any outstanding items of work. The Designer shall review the Contractor's estimate and either approve it or provide an independent estimate for all such items. If the Contractor fails to complete the remaining items within the time specified in the Certificate, the Owner may terminate the contract and go to the surety for project completion in accordance with Article 7.2 or release the contract balance to the Contractor less 150% of the approved estimate to complete the outstanding items. Upon completion of the outstanding items, when a final cost has been established, any monies remaining shall be paid to the Contractor. Failure to complete items of work does not relieve the Contractor from the obligation to complete the administrative requirements of the contract, such as the provisions of Article 5.3 FAILURE TO COMPLETE ALL ITEMS OF WORK UNDER THE CONTRACT SHALL BE CONSIDERED A DEFAULT AND BE GROUNDS FOR CONTRACT TERMINATION AND DEBARMENT.

D. Liquidated Damages. Contractor agrees that the Owner may deduct from the contract price and retain as liquidated damages, and not as penalty or forfeiture, the sum stipulated in this contract for each work day after the Contract Completion Day on which work is not Substantially Complete. Assessment of Liquidated Damages shall not relieve the Contractor or the surety of any responsibility or obligation under the Contract. In addition, the Owner may, without prejudice to any other rights, claims, or remedies the Owner may have including the right to Liquidated Damages, charge the Contractor for all additional expenses incurred by the Owner and/or Designer as the result of the extended contract period through Final Completion. Additional Expenses shall include but not be limited to the costs of additional inspections.

E. Early Completion. The Contractor has the right to finish the work before the contract completion date; however, the Owner assumes no liability for any hindrances to the Contractor unless Owner caused delays result in a time extension to the contract completion date. The Contractor shall not be entitled to any claims for lost efficiencies or for delay if a Certificate of Substantial Completion is given on or before the Contract Completion Date.

ARTICLE 5.4 -- PAYMENT TO CONTRACTOR

A. Payments on account of this contract will be made monthly in proportion to the work which has been completed. Request for payment must be submitted on the Owner's forms. No other pay request will be processed. Supporting breakdowns must be in the same format as Owner's forms and must provide the same level of detail. The Designer will, within 5 working days from receipt of the contractor's request for payment either issue a Certificate for Payment to the Owner, for such amount as the Designer determines is properly due, or notify the Contractor in writing of reasons for withholding a Certificate. The Owner shall make payment within 30 calendar days after the "Application and Certification for Payment" has been received and certified by the Designer. The following items are to be attached to the contractor's pay request:

1. Updated construction schedule
2. Certified payrolls consisting of name, home addresses of all workers, occupation and craft, number of hours worked and actual wages paid for each individual employee, of the Contractor and all subcontractors working on the project

B. The Owner shall retain 5 percent of the amount of each such payment application, except as allowed by Article 5.4, until final completion and acceptance of all work covered by this contract.

C. Each payment made to Contractor shall be on account of the total amount payable to Contractor and all material and work covered by paid partial payment shall thereupon become the sole property of Owner. This provision shall not be construed as relieving Contractor from sole responsibility for care and protection of materials and work upon which payments have been made or restoration of any damaged work or as a waiver of the right of Owner to require fulfillment of all terms of this contract.

D. Materials delivered to the work site and not incorporated in the work will be allowed in the Application and Certification for Payment on the basis of one hundred (100%) percent of value, subject to the 5% retainage providing that they are suitably stored on the site or in an approved warehouse in accordance with the following requirements:

1. Material has previously been approved through submittal and acceptance of shop drawings conforming to requirements of Article 3.2 of General Conditions.

2. Delivery is made in accordance with the time frame on the approved schedule.

3. Materials, equipment, etc., are properly stored and protected from damage and deterioration and remain so - if not, previously approved amounts will be deleted from subsequent pay applications.

4. The payment request is accompanied by a breakdown identifying the material equipment, etc. in sufficient detail to establish quantity and value.

E. The Contractor shall be allowed to include in the Application and Certification for Payment, one hundred (100%) of the value, subject to retainage, of major equipment and material stored off the site if all of the following conditions are met:

1. The request for consideration of payment for materials stored off site is made at least 15 working days prior to submittal of the Application for Payment including such material. Only materials inspected will be considered for inclusion on Application for Payment requests.

2. Materials stored in one location off site are valued in excess of $25,000.

3. That a Certificate of Insurance is provided indicating adequate protection from loss, theft conversion or damage for materials stored off site. This Certificate shall show the State of Missouri as an additional insured for this loss.

4. The materials are stored in a facility approved and inspected, by the Construction Representative.

5. Contractor shall be responsible for, Owner costs to inspect out of state facilities, and any delays in the completion of the work caused by damage to the material or for any other failure of the Contractor to have access to this material for the execution of the work.

F. The Owner shall determine the amount, quality and acceptability of the work and materials which are to be paid for under this contract. In the event any questions shall arise between the parties, relative to this contract or specifications, determination or decision of the Owner or the Construction Representative and the Designer shall be a condition precedent to the right of the Contractor to receive any money or payment for work under this contract affected in any manner or to any extent by such question.

G. Payments Withheld: The Owner may withhold or nullify in whole or part any certificate to such extent as may be necessary to protect the Owner from loss on account of:

1. Defective work not remedied. When a notice of noncompliance is issued on an item or items, corrective action shall be undertaken immediately. Until corrective action is completed, no monies will be paid and no additional time will be allowed for the item or items. The cost of corrective action(s) shall be borne by the Contractor.

2. A reasonable doubt that this contract can be completed for the unpaid balance.

3. Failure of the Contractor to update as-built drawings monthly for review by the Construction Representative.

4. Failure of the Contractor to update the construction schedule.

When the Construction Representative is satisfied the Contractor has remedied above deficiencies, payment shall be released.

H. Final Payment: Upon receipt of written notice from the Contractor to the Designer and Project Representative that the work is ready for final inspection and acceptance, the Designer and Project Representative, with the Contractor, shall promptly make such inspection. If the work is acceptable and the contract fully performed, the Construction Representative shall complete a final acceptance report and the Contractor will be

directed to submit a final Application and Certification for Payment. If the Owner approves the same, the entire balance shall be due and payable, with the exception of deductions as provided for under Article 5.4.

1. Where the specifications provide for the performance by the Contractor of (certain tests for the purpose of balancing and checking the air conditioning and heating equipment and the Contractor shall have furnished and installed all such equipment in accordance with the specifications, but said test cannot then be made because of climatic conditions, such test shall may be considered as required under the provisions of the specifications, Section 013300 and this contract may be substantial Full payment will not be made until the tests have been made and the equipment and system is finally accepted. If the tests are not completed when scheduled, the Owner may deduct 150% of the value of the tests from the final payment.
2. The final payment shall not become due until the Contractor delivers to the Construction Representative:

    a) A complete file of releases, on the standard form included in the contract documents as "Final Receipt of Payment and Release Form", from subcontractors and material suppliers evidencing payment in full for services, equipment and materials, as the case may require, if the Owner approves, or a consent from the Surety to final payment accepting liability for any unpaid amounts.

    b) An Affidavit of Compliance with Prevailing Wage Law, in the form as included in this contract specifications, properly executed by each subcontractor, and the Contractor

    c) Certified copies of all payrolls

    d) As-built drawings

3. If any claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such a claim including all costs and a reasonable attorney's fee.
4. Missouri statute requires prompt payment from the Owner to the Contractor within thirty calendar days and from the Contractor to his subcontractors within fifteen calendar days. Failure to make payments within the required time frame entitles the receiving party to charge interest at the rate of one and one half percent per month calculated from the expiration of the statutory time period until paid.
5. The value of all unused unit price allowances and/or 150% of the value of the outstanding work items, and/or liquidated damages may be deducted from the final pay request without executing a Contract Change. Any unit price items which exceed the number of units in the contract may be added by Contract Change.

ARTICLE 6 -- INSURANCE AND BONDS

ARTICLE 6.1 -- BOND

A. Contractor shall furnish a performance/payment bond in an amount equal to 100% of the contract price to guarantee faithful performance of the contract and 100% of the contract price to guarantee the payment of all persons performing labor on the project and furnishing materials in connection therewith under this contract as set forth in the standard form of performance and payment bond included in the contract documents. The surety on such bond shall be issued by a surety company authorized by the Missouri Department of Insurance to do business in the state of Missouri.

B. All Performance/Payment Bonds furnished in response to this provision shall be provided by a bonding company with a rating of B+ or higher as established by A.M. Best Company, Inc. in their most recent publication.

ARTICLE 6.2 – INSURANCE

A. The successful Contractor shall procure and maintain for the duration of the contract issued a policy or policies of insurance for the protection of both the Contractor and the Owner and their respective officers, officials, agents, consultants and employees. The Owner requires certification of insurance coverage from the Contractor prior to commencing work.

B. Minimum Scope and Extent of Coverage

1. General Liability

Commercial General Liability, ISO coverage form number or equivalent CG 00 01 ("occurrence" basis), or I-SO coverage form number CG 00 02, or ISO equivalent.

If ISO equivalent or manuscript general liability coverage forms are used, minimum coverage will be as follows: Premises/Operations; Independent Contractors; Products/Completed Operations; personal Injury; Broad Form Property Damage including Completed Operations; Broad Form Contractual Liability Coverage to include Contractor's obligations under Article 1.11 Indemnification and any other Special Hazards required by the work of the contract.

2. Automobile Liability

Business Automobile Liability Insurance, ISO Coverage form number or equivalent CA 00 01 covering automobile liability, code 1 "ANY AUTO".

3. Workers' Compensation and Employer's Liability

Statutory Workers' Compensation Insurance for Missouri and standard Employer's Liability Insurance, or the authorization to self-insure for such liability from the Missouri Division of Workers' Compensation.

4. Builder's Risk or Installation Floater Insurance

Insurance upon the work and all materials, equipment, supplies, temporary structures and similar items which may be incident to the performance of the work and located at or adjacent to the site, against loss or damage from fire and such other casualties as are included in extended coverage in broad "All Risk" form, including coverage for Flood and Earthquake, in an amount not less than the replacement cost of the work or this contact price, whichever is greater, with loss payable to Contractor and Owner as their respective interests may appear.

Contractor shall maintain sufficient insurance to cover the full value of the work and materials as the work progresses, and shall furnish Owner copies of all endorsements. If Builder's Risk Reporting- Form of Endorsement is used, Contractor shall make all reports as required therein so as to keep in force an amount of insurance which will equal the replacement cost of the work, materials, equipment, supplies, temporary structures, and other property covered thereby; and if, as a result of Contractor's failure to make any such report, the amount of insurance so recoverable shall be less than such replacement cost, Contractor's interest in the proceeds of such insurance, if any, shall be subordinated to Owner's interest to the end that Owner may receive full reimbursement for its loss.

C. Minimum Limits of Insurance

1. General Liability

Contractor

$2,000,000	combined single limit per occurrence for bodily injury, personal injury, and property damage
$2,000,000	annual aggregate

2. Automobile Liability

$2,000,000	combined single limit per occurrence for bodily injury and property damage

3. Workers' Compensation and Employers Liability

Workers' Compensation limits as required by applicable State Statutes (generally unlimited) and minimum of $1,000,000 limit per accident for Employer's Liability.

General Liability and Automobile Liability insurance may be arranged under individual policies for the full limits required or by a combination of underlying policies with the balance provided by a form-following Excess or Umbrella Liability policy.

D. Deductibles and Self-Insured Retentions

All deductibles, co-payment clauses, and self-insured retentions must be declared to and approved by the Owner. The Owner reserves the right to request the reduction or elimination of unacceptable deductibles or self-insured retentions, as they would apply to the Owner, and their respective officers, officials, agents, consultants and employees. Alternatively, the Owner may request Contractor to procure a bond guaranteeing

payment of losses and related investigations, claims administration, and defense expenses.

E. Other Insurance Provisions and Requirements

The respective insurance policies and coverage, as specified below, must contain, or be endorsed to contain the following conditions or provisions:

1. General Liability

The Owner, and its respective commissioners, officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 Additional Insured - Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance of self-insurance programs maintained by the designated additional -insured's shall be excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's general liability insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner, or for any of their officers, officials, agents, consultants or employees.

2. Automobile Insurance

The Owner, and their respective officers, officials, agents, consultants and employees shall be endorsed as additional insured's by ISO form CG 20 26 - Additional Insured Designated Person or Organization. As additional insured's, they shall be covered as to work performed by or on behalf of the Contractor or as to liability which arises out of Contractor's activities or resulting from the performance of services or the delivery of goods called for by the Contract.

Contractor's insurance coverage shall be primary with respect to all additional insured's. Insurance or self-insurance programs maintained by the designated additional insured's shall be in excess of the Contractor's insurance and shall not contribute with it.

Additionally, the Contractor and Contractor's automobile insurer shall agree to waive all rights of subrogation against the Owner and any of their respective officers, officials, agents, consultants or employees for claims, losses, or expenses which arise out of Contractor's activities or result from the performance of services or the delivery of goods called for by the Contract.

Contractor's failure to comply with the terms and conditions of these insurance policies shall not affect or abridge coverage for the Owner or for any of its officers, officials, agents, consultants or employees.

3. Workers' Compensation/Employer's Liability

Contractor's workers' compensation insurance shall be endorsed with NCCI form WC 00 03 01 A - Alternative Employer Endorsement. The Alternative Employer Endorsement shall designate the Owner as "alternate employers."

4. All Coverages

Each insurance policy required by this section of the Contract shall contain a stipulation, endorsed if necessary, that the Owner will receive a minimum of a thirty (30) calendar day advance notice of any policy cancellation. Ten (10) calendar days advance notice is required for policy cancellation due to non-payment of premium.

F. Insurer Qualifications and Acceptability

Insurance required hereunder shall be issued by an A.M. Best, "B+" rated, Class IX insurance company approved to conduct insurance business in the state of Missouri.

G. Verification of Insurance Coverage

Prior to Owner issuing a Notice to Proceed, the Contractor-shall furnish the Owner with Certificate(s) of Insurance and with any applicable original endorsements evidencing the required insurance coverage. The insurance certificates and endorsements are to be signed by a person authorized by that insurer to bind coverage on its behalf. All certificates and endorsements received by the Owner are subject to review and approval by the Owner. The Owner reserves the right to require certified copies of all required policies at any time. If the scope of this contract will exceed one (1) year - or, if any of Contractor's applicable insurance coverage expires prior to completion of the work or services required under this contract -

the Contractor will provide a renewal or replacement certificate before continuing work or services hereunder. If the Contractor fails to provide documentation of required insurance coverage, the Owner may issue a stop work order and no additional contract completion time and/or compensation shall be granted as a result thereof.

ARTICLE 7 – SUSPENSION OR TERMINATION OF CONTRACT

ARTICLE 7.1 - FOR SITE CONDITIONS

When conditions at the site of the proposed work are considered by the Owner to be unsatisfactory for prosecution of the work, the Contractor may be ordered in writing to suspend the work or any part thereof until reasonable conditions exist. When such suspension is not due to fault or negligence of the Contractor, time allowed for completion of such suspended work will be extended by a period of time equal to that lost due to delay occasioned by ordered suspension. This will be a no cost time extension.

ARTICLE 7.2 - FOR CAUSE

A. Termination or Suspension for Cause:

1. If the Contractor shall file for bankruptcy, or should make a general assignment for the benefit of the creditors, or if a receiver should be appointed on account of insolvency, or if the contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workers or proper materials, or if the contractor should fail to make prompt payment to subcontractors or for material or labor, or persistently disregard laws, ordinances or the instructions of the Owner, or otherwise be guilty of a substantial violation of any provision of this contract, then the Owner may serve notice on the Contractor and the surety setting forth the violations and demanding compliance with this contract. Unless within ten (10) consecutive calendar days after serving such notice, such violations shall cease and satisfactory arrangements for correction be made, the Owner may suspend the Contractor's right to proceed with the work or terminate this contract.

2. In the event the Owner suspends Contractor's right to proceed with the work or terminates the contract, the Owner may demand that the Contractor's surety take over and complete the work on this contract, after the surety submits a written proposal to the Owner and receives written approval and upon the surety's failure or refusal to do so within ten (10) consecutive calendar days after demand therefore, the Owner may take over the work and prosecute the same to completion by bid or negotiated contract, or the Owner may elect to take possession of and utilize in completing the work such materials, supplies, appliances and plant as may be on the site of the work, and all subcontractors, if the Owner elects, shall be bound to perform their contracts.

B. The Contractor and its surety shall be and remain liable to the Owner for any excess cost or damages occasioned to the Owner as a result of the actions above set forth.

C. The Contractor in the event of such suspension or termination shall not be entitled to receive any further payments under this contract until the work is wholly finished. Then if the unpaid balance under this contract shall exceed all expenses of the Owner as certified by the Director, such excess shall be paid to the Contractor; but, if such expenses shall exceed the unpaid balance as certified by the Director, the Contractor and their surety shall be liable for and shall pay the difference and any damages to the Owner.

D. In exercising Owner's right to secure completion of the work under any of the provisions hereof, the Director shall have the right to exercise Owner's sole discretion as to the manner, methods and reasonableness of costs of completing the work.

E. The rights of the Owner to suspend or terminate as herein provided shall be cumulative and not exclusive and shall be in addition to any other remedy provided by law.

F. The Contractor in the event of such suspension or termination may be declared ineligible for Owner contracts for a minimal period of twelve (12) months. Further, no contract will be awarded to any Contractor who lists in their bid form any subcontractor whose prior performance has contributed, as determined by the Owner, to a breach of a contract. In order to be considered for state-awarded contracts after this period, the Contractor/subcontractor will be required to forward acceptance reports to the Owner regarding successful completion of non-state projects during the intervening twelve (12) months from the date of default. No contracts will be awarded to a subcontractor/Contractor until the ability to perform responsibly in the private sector has been proven to the Owner.

ARTICLE 7.3 -- FOR CONVENIENCE

A. The Owner may terminate or suspend the Contract or any portion of the Work without cause at any time, and at the Owner's convenience. Notification of a termination or suspension shall be in writing

and shall be given to the Contractor and their surety. If the Contract is suspended, the notice will contain the anticipated duration of the suspension or the conditions under which work will be permitted to resume. If appropriate, the Contractor will be requested to demobilize and re-mobilize and will be reimbursed time and costs associated with the suspension.

B. Upon receipt of notification, the Contractor shall:

1. Cease operations when directed.

2. Take actions to protect the work and any stored materials.

3. Place no further subcontracts or orders for material, supplies, services or facilities except as may be necessary to complete the portion of the Contract that has not been terminated. No claim for payment of materials or supplies ordered after the termination date shall be considered.

4. Terminate all existing subcontracts, rentals, material, and equipment orders.

5. Settle all outstanding liabilities arising from termination with subcontractors and suppliers.

6. Transfer title and deliver to the Owner, work in progress, completed work, supplies and other material produced or acquire for the work terminated, and completed or partially completed plans, drawings information and other property that, if the Contract had been completed, would be required to be furnished to the Owner.

C. For termination without cause and at the Owner's convenience, in addition to payment for work completed prior to date of termination, the Contractor may be entitled to payment of other documented costs directly associated with the early termination of the contract. Payment for anticipated profit and unapplied overhead will not be allowed.

SECTION 007300 - SUPPLEMENTARY CONDITIONS

1.0 GENERAL:

A. These Supplementary General Conditions clarify, add, delete, or otherwise modify standard terms and conditions of DIVISION 00, BIDDING AND CONTRACTING REQUIREMENTS.

2.0 CONTACTS:

Project Manager:

Nathan Graessle
Division of Facilities Management, Design and Construction
301 West High Street, Room 730
Jefferson City, MO 65101
Telephone: 573-508-6646
Email: nathaniel.graessle@oa.mo.gov

3.0 NOTICE: ALL BID MATERIALS ARE DUE AT THE TIME OF BID SUBMITTAL. THERE IS NO SECOND SUBMITTAL FOR THIS PROJECT.

4.0 FURNISHING CONSTRUCTION DOCUMENTS:

A. The Owner will furnish the Contractor with approximately 5 complete sets of drawings and specifications at no charge.

B. The Owner will furnish the Contractor with approximately 5 sets of explanatory or change drawings at no charge.

C. The Contractor may make copies of the documents as needed with no additional cost to the Owner.

5.0 SAFETY REQUIREMENTS

Contractor and subcontractors at any tier shall comply with RSMo 292.675 and Article 1.3, E, of Section 007213, General Conditions.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MIKE KEHOE, Governor

Annual Wage Order No. 33

Section 049
JASPER COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Logan Hobbs, Director
Division of Labor Standards

Filed With Secretary of State: **March 10, 2026**

Last Date Objections May Be Filed: **April 9, 2026**

Prepared by Missouri Department of Labor and Industrial Relations

JASPER COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Asbestos Worker	$36.85
Boilermaker	$29.74*
Bricklayer - Stone Mason	$29.74*
Carpenter	$53.12
Lather	
Linoleum Layers & Cutter	
Millwright	
Pile Driver	
Cement Mason	$44.79
Plasterer	
Communication Technician	$29.74*
Electrician (Inside Wireman)	$53.12
Electrician (Outside Lineman)	$29.74*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Elevator Constructor	$29.74*
Glazier	$50.02
Iron Worker	$70.65
Laborer	$43.28
Laborer - First Semi-Skilled	
Laborer - General	
Laborer - Second Semi-Skilled	
Laborer - Skilled	
Mason	$64.98
Marble Finisher	
Marble Mason	
Terrazzo Finisher	
Terrazzo Worker	
Tile Finisher	
Tile Setter	
Operating Engineer	$68.99
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group III - A	
Operating Engineer - Group IV	
Operating Engineer - Group V	
Painter	$43.57
Plumber	$57.44
Pipe Fitter	
Roofer/WaterProofer	$47.05
Sheet Metal Worker	$59.12
Sprinkler Fitter - Fire Protection	$29.74*
Truck Driver	$29.74*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

*** The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. The public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title as defined in RSMo Section 290.210.**

JASPER COUNTY

OCCUPATIONAL TITLE	**Prevailing Hourly Rate
Carpenter	$29.74*
Millwright	
Pile Driver	
Electrician (Outside Lineman)	$29.74*
Outside - Groundman	
Outside - Groundman Tree Trimmer	
Outside - Lineman Operator	
Outside - Lineman Tree Trimmer	
Laborer	$49.11
Laborer - General	
Laborer - Skilled	
Operating Engineer	$57.27
Operating Engineer - Group I	
Operating Engineer - Group II	
Operating Engineer - Group III	
Operating Engineer - Group IV	
Truck Driver	$29.74*
Truck Control Service Driver	
Truck Driver, Teamsters Group I	
Truck Driver, Teamsters Group II	
Truck Driver, Teamsters Group III	
Truck Driver, Teamsters Group IV	

Use Heavy Construction Rates on Highway and Heavy construction in accordance iwth the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title shown on the Building Construction Rate Sheet.

***The Division of Labor Standards received fewer than 1,000 reportable hours for this occupational title. Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center.**

****The Prevailing Hourly Rate includes any applicable fringe benefit amounts for each occupational title.**

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 011000 – SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and Division 1 Specification Sections apply to this Section.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project consists of a new single story 40 bed CSC to include district office in addition to program/classroom areas and housing space for 40 residents.

1. Project Location: **2303 West 20th Street, Joplin, Missouri 64108**

2. Owner: State of Missouri, Office of Administration, Division of Facilities Management, Design and Construction, Harry S Truman State Office Building, Post Office Box 809, 301 West High Street, Jefferson City, Missouri 65102.

B. Contract Documents, dated **9/30/2026** were prepared for the Project by **ACIB Architects, 1710 Wyandotte, Kansas City, Missouri 64108**

C. The Work consists of **new construction of the project as summarized above.**

1. The Work includes **all necessary components to create a functional new building as depicted in the drawings and specifications.**

D. The Work will be constructed under a single prime contract.

1.3 WORK UNDER OTHER CONTRACTS

A. Cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

1.4 WORK SEQUENCE

A. The Work will be conducted in **One** phase.

1.5 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractor's use of the premises limited only by the Owner's right to perform work or to retain other contractors on portions of the Project.

B. Use of the Site: Limit use of the premises to work in areas indicated. Confine operations to areas within contract limits indicated. Do not disturb portions of the site beyond the areas in which the Work is indicated.

1. Owner Occupancy: Allow for Owner occupancy and use by the public.

2. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to the Owner, the Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Use of the Existing Building: Maintain the existing building in a weathertight condition throughout the construction period. Repair damage cause by construction operations. Take all precautions necessary to protect the building and its occupants during the construction period..

1.6 OCCUPANCY REQUIREMENTS

A. Full Owner Occupancy: The Owner will occupy the site and existing building during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts and facilitate owner usage. Perform the Work so as not to interfere with the Owner's operations.

B. Partial Owner Occupancy: The Owner reserves the right to occupy and to place and install equipment in completed areas of the building prior to Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. The Designer will prepare a Certificate of Partial Occupancy for each specific portion of the Work to be occupied prior to substantial completion.

2. Prior to partial Owner occupancy, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Upon occupancy, the Owner will operate and maintain mechanical and electrical systems serving occupied portions for the building.

3. Upon occupancy, the Owner will assume responsibility for maintenance and custodial service for occupied portions for the building.

1.7 OWNER-FURNISHED PRODUCTS

A. The Work includes providing support systems to receive Owner's equipment, and mechanical and electrical connections.

1. The Owner will arrange for and deliver necessary shop drawings, product data, and samples to the Contractor.

2. The Owner will arrange and pay for delivery of Owner-furnished items according to the contractor's Construction Schedule.

3. The Contractor is responsible for receiving, unloading and handling Owner furnished items at the site.

4. Following delivery, the Contractor will inspect items delivered for damage. The Contractor shall not accept damaged items and shall notify the Owner of rejection of damaged items.

5. If Owner-furnished items are damaged, defective, or missing, the Owner will arrange for replacement.

6. The Owner will arrange for manufacturer's field services and for the delivery of manufacturer's warranties to the appropriate Contractor.

7. The Contractor shall designate delivery dates of Owner-furnished items in the Contractor's Construction Schedule.

8. The Contractor shall review shop drawings, product data and samples and return them to the Designer noting discrepancies or problems anticipated in use of the project.

9. The Contractor is responsible for protecting Owner-furnished items from damage, including damage from exposure to the elements. The Contractor shall repair or replace items damaged as a result of his operations.

1.8 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF PRODUCTS ORDERED IN ADVANCE

END OF SECTION 011000

SECTION 012100 – ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.

B. Types of allowances include the following:

1. Lump-sum allowances.
2. Weather allowances.

C. Related Sections include the following:

1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.

1.3 WEATHER ALLOWANCE

A. Included within the completion period for this project are a specified number of “bad weather” days (see Schedule of Allowances).

B. The Contractor’s progress schedule shall clearly indicate the bad weather day allowance as an “activity” or “activities”. In the event weather conditions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to weather (a “bad weather” day) and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.

C. The Contractor’s Representative and the Construction Representative shall agree daily on the number of “bad weather” days to be charged against the allowance. This determination will be documented in writing and be signed by the Contractor and the Construction Representatives. If there is a failure to agree on all or part of the “bad weather” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “bad weather” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “bad weather” day determination contained in that document.

D. There will be no modification to the time of contract performance due solely to the failure to deplete the “bad weather” day allowance.

E. Once this allowance is depleted, a no cost Change Order time extension will be executed for “bad weather” days, as defined above, encountered during the remainder of the Project.

1.4 FACILITY INTERRUPTION ALLOWANCE

A. Included within the completion period for this project are a specified number of “Facility Interruption” days (see Schedule of Allowances).

B. The Contractor’s progress schedule shall clearly indicate the facility interruption day allowance as an “activity” or “activities”. In the event facility interruptions preclude performance of critical work activities for 50% or more of the Contractor’s scheduled workday, that day shall be declared unavailable for work due to facility interruption and charged against the above allowance. Critical work activities will be determined by review of the Contractor’s current progress schedule.

C. The Contractor’s Representative and the Construction Representative shall agree monthly on the number of “facility interruption” days to be charged against the allowance. This determination will be documented in writing and be signed by the Contractor and the Construction Representatives. If there is a failure to agree on all or part of the “facility interruption” days for a particular month, that disagreement shall be noted on this written document and signed by each party’s representative. Failure of the Contractor’s representative to sign the “facility interruption” day documentation after it is presented, with or without the notes of disagreement, shall constitute agreement with the “facility interruption” day determination contained in that document.

D. There will be no modification to the time of contract performance due solely to the failure to deplete the “facility interruption” day allowance.

E. Once this allowance is depleted, a no cost Change Order time extension will be executed for “facility interruption days” days, as defined above, encountered during the remainder of the Project.

1.5 SELECTION AND PURCHASE

A. At the earliest practical date after award of the Contract, Designer of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.

B. At Designer's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by Designer from the designated supplier.

1.6 SUBMITTALS

A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 COORDINATION

A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.8 [LUMP-SUM] ALLOWANCES

A. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials [selected by Designer] under allowance shall be included as part of the Contract Sum and not part of the allowance.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Weather Allowance: Included within the completion period for this Project 20 “bad weather” days.

END OF SECTION 012100

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Bid Form and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing Alternates.

1.3 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents..

1. The cost for each alternate is the net addition to the Contract Sum to incorporate the Alternate into the Work. No other adjustments are made to the Contract Sum.

B. No additional time will be allowed for alternate work unless the number of work days is so stated on the bid form.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent Work as necessary to completely and fully integrate the Alternate Work into the Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: The award of the Contract will indicate whether alternates have been accepted or rejected.

C. Execute accepted alternates under the same conditions as other Work of this Contract.

D. Schedule: A “Schedule of Alternates” is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: *West Porch Canopy (West of Gridline B):*
1. Add exterior canopy, columns, Roof, and structure west of gridline B. Include all architectural, structural, and Electrical scope; RE: plans, sections, elevations, and details

throughout the drawing set. See sheet G-112 for more information. Base bid to include airlock and vestibule 169; Roof condition similar to vestibule 161.

B. Alternate No. 2: *Maintenance Shed:*
   1. Add maintenance shed. Include all architectural, structural, and electrical scope. See plan sheet G-112 for more information. Base bid to be slab and electrical conduits with pulls.

C. Alternate No. 3: *Outdoor Equipment*
   1. Add outdoor furniture, exercise equipment, and associated pads, pickleball court; RE: Civil, FFE, And Lanscape plans, sections, elevations, and details throughout. Add pergola columns and foundations. Include all architectural and structural scope. See sheet G-112 for more information. Base bid to be grading and slab outside family reunification.

D. Alternate No. 4: Gravel Track
   1. Add gravel and sub-grading for track. Re: Civil & Landscape Plans, Sections, Elevations, & Details Throughout. Base Bid to be grading for track; Tree's and Rocks. See sheet G-112 for more information.

END OF SECTION 012300

SECTION 012600 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling and processing Contract Modifications.

B. Related Sections include the following:

1. Division 1, Section 012100 "Allowances" for procedural requirements for handling and processing Allowances.
2. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.
3. Division 0, Section 007213, Article 3.1 "Acceptable Substitutions" for administrative procedures for handling Requests for Substitutions made after Contract award.
4. Division 0, Section 007213, Article 4.0 "Changes in the Work" for Change Order requirements.

1.3 REQUESTS FOR INFORMATION

A. In the event that the Contractor or Subcontractor, at any tier, determines that some portion of the Drawings, Specifications, or other Contract Documents requires clarification or interpretation, the Contractor shall submit a “Request for Information” (RFI) in writing to the Designer. A RFI may only be submitted by the Contractor and shall only be submitted on the RFI forms provided by the Owner. The Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response is needed. In the RFI, the Contractor shall set forth an interpretation or understanding of the requirement along with reasons why such an understanding was reached.

B. Responses to RFI shall be issued within ten (10) working days of receipt of the Request from the Contractor unless the Designer determines that a longer time is necessary to provide an adequate response. If a longer time is determined necessary by the Designer, the Designer will, within five (5) working days of receipt of the request, notify the Contractor of the anticipated response time. If the Contactor submits a RFI on a time sensitive activity on the current project schedule, the Contractor shall not be entitled to any time extension due to the time it takes the Designer to respond to the request provided that the Designer responds within the ten (10) working days set forth above.

C. Responses from the Designer will not change any requirement of the Contract Documents. In the event the Contractor believes that a response to a RFI will cause a change to the requirements of the Contract Document, the Contractor shall give written

notice to the Designer requesting a Change Order for the work. Failure to give such written notice within ten (10) working days, shall waive the Contractor's right to seek additional time or cost under Article 4, "Changes in the Work" of the General Conditions.

1.4 MINOR CHANGES IN THE WORK

A. Designer will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Amount or the Contract Time, on "Designer's Supplemental Instructions" (DSI).

1.5 PROPOSAL REQUESTS

A. The Designer or Owner Representative will issue a detailed description of proposed Changes in the Work that may require adjustment to the Contract Amount or the Contract Time. The proposed Change Description will be issued using the "Request for Proposal" (RFP) form. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by the Designer or Owner Representative are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.

2. Within ten (10) working days after receipt of Proposal Request, submit a proposal for the cost adjustments to the Contract Amount and the Contract Time necessary to execute the Change. The Contractor shall submit his proposal on the appropriate Change Order Detailed Breakdown form. Subcontractors may use the appropriate Change Order Detailed Breakdown form or submit their proposal on their letterhead provided the same level of detail is included. All proposals shall include:

   a. A detailed breakdown of costs per Article 4.1 of the General Conditions.

   b. If requesting additional time per Article 4.2 of the General Conditions, include an updated Contractor's Construction Schedule that indicates the effect of the Change including, but not limited to, changes in activity duration, start and finish times, and activity relationship.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, the Designer or Owner Representative will issue a Change Order for signatures of Owner and Contractor on the "Change Order" form.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

SECTION 013100 – COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes administrative provisions for coordinating construction operations on Projects including, but not limited to, the following:

1. Coordination Drawings.
2. Administrative and supervisory personnel.
3. Project meetings.

B. Each Contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific Contractor.

C. Related Sections include the following:

1. Division 1, Section 013200 "Schedule - Bar Chart" for preparing and submitting Contractor's Construction Schedule.
2. Articles 1.8.B and 1.8.C of Section 007213 "General Conditions" for coordinating meetings onsite.
3. Article 5.4.H of Section 007213 "General Conditions" for coordinating Closeout of the Contract.

1.3 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections, which depend on each other for proper installation, connection, and operation.

B. Coordination: Each Contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each Contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required

maintenance, service, and repair of all components including mechanical and electrical.

C. Prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate Contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other Contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's Construction Schedule.
2. Preparation of the Schedule of Values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Startup and adjustment of systems.
8. Project Closeout activities.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

B. Key Personnel Names: Within fifteen (15) work days of starting construction operations, submit a list of key personnel assignments including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 PROJECT MEETINGS

A. The Owner’s Construction Representative will schedule a Pre-Construction Meeting prior to beginning of construction. The date, time, and exact place of this meeting will be determined after Contract Award and notification of all interested parties. The

Contractor shall arrange to have the Job Superintendent and all prime Subcontractors present at the meeting. During the Pre-Construction Meeting, the construction procedures and information necessary for submitting payment requests will be discussed and materials distributed along with any other pertinent information.

1. Minutes: Designer will record and distribute meeting minutes.

B. Progress Meetings: The Owner's Construction Representative will conduct Monthly Progress Meetings as stated in Articles 1.8.B and 1.8.C of Section 007213 "General Conditions".

1. Minutes: Designer will record and distribute to Contractor the meeting minutes.

C. Preinstallation Conferences: Contractor shall conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of Manufacturers and Fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Designer and Construction Representative of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration including requirements for the following:

    a. Contract Documents

    b. Options

    c. Related RFIs

    d. Related Change Orders

    e. Purchases

    f. Deliveries

    g. Submittals

    h. Review of mockups

    i. Possible conflicts

    j. Compatibility problems

    k. Time schedules

    l. Weather limitations

    m. Manufacturer's written recommendations

    n. Warranty requirements

    o. Compatibility of materials

    p. Acceptability of substrates

    q. Temporary facilities and controls

    r. Space and access limitations

    s. Regulations of authorities having jurisdiction

    t. Testing and inspecting requirements

u. Installation procedures

v. Coordination with other Work

w. Required performance results

x. Protection of adjacent Work

y. Protection of construction and personnel

3. Contractor shall record significant conference discussions, agreements, and disagreements including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

6. Revise paragraph below if Project requires holding progress meetings at different intervals. Insert special intervals such as "every third Tuesday" to suit special circumstances.

7. Project name

8. Name and address of Contractor

9. Name and address of Designer

10. RFI number including RFIs that were dropped and not submitted

11. RFI description

12. Date the RFI was submitted

13. Date Designer's response was received

14. Identification of related DSI or Proposal Request, as appropriate

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013115 - PROJECT MANAGEMENT COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.

B. Division 1, Section 013300 - Submittals

C. Division 1, Section 012600 – Contract Modification Procedures

1.2 SUMMARY

A. Project Management Communications: The Contractor shall use the Internet web-based project management communications tool, Trimble Unity Construct® (Formerly eBuilder) ASP software, and protocols included in that software during this project. The use of project management communications as herein described does not replace or change any contractual responsibilities of the participants.
   1. Project management communications is available through Trimble Unity Construct® (Formerly eBuilder) as provided by "Trimble Unity Construct®" in the form and manner required by the Owner.
   2. The project communications database is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of each project participant. The sharing of user accounts is prohibited

B. Support: Trimble Unity Construct® (Formerly eBuilder) will provide on-going support through on-line help files.

C. Copyrights and Ownership: Nothing in this specification or the subsequent communications supersedes the parties' obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD/BIM files, processes or design information distributed in this system is intended only for the project specified herein.

D. Purpose: The intent of using Trimble Unity Construct®(Formerly eBuilder) is to improve project work efforts by promoting timely initial communications and responses. Secondly, to reduce the number of paper documents while providing improved record keeping by creation of electronic document files

E. Authorized Users: Access to the web site will be by individuals who are authorized users.

1. Individuals shall complete the Trimble Unity Construct (Formerly eBuilder) New Company/User Request Form located at the following web site: https://oa.mo.gov/facilities/vendor-links/contractor-forms. Completed forms shall be emailed to the following email address: OA.FMDCE-BuilderSupport@oa.mo.gov.
2. Authorized users will be contacted directly and assigned a temporary user password.
3. Individuals shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.

F. Administrative Users: Administrative users have access and control of user licenses and all posted items. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE! Improper or abusive language toward any party or repeated posting of items intended to deceive or disrupt the work of the project will not be tolerated and will result in deletion of the offensive items and revocation of user license at the sole discretion of the Administrative User(s).

G. Communications: The use of fax, email and courier communication for this project is discouraged in favor of using Trimble Unity Construct® (Formerly eBuilder) to send messages. Communication functions are as follows:
1. Document Integrity and Revisions:
   a. Documents, comments, drawings and other records posted to the system shall remain for the project record. The authorship time and date shall be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp shall be the method used to make modifications or corrections.
   b. The system shall make it easy to identify revised or superseded documents and their predecessors.
   c. Server or Client-side software enhancements during the life of the project shall not alter or restrict the content of data published by the system. System upgrades shall not affect access to older documents or software.
2. Document Security:
   a. The system shall provide a method for communication of documents. Documents shall allow security group assignment to respect the contractual parties communication except for Administrative Users. DO NOT POST PRIVATE OR YOUR COMPANY CONFIDENTIAL ITEMS IN THE DATABASE!
3. Document Integration:
   a. Documents of various types shall be logically related to one another and discoverable. For example, requests for information, daily field reports, supplemental sketches and photographs shall be capable of reference as related records.
4. Reporting:
   a. The system shall be capable of generating reports for work in progress, and logs for each document type. Summary reports generated by the system shall be available for team members.
5. Notifications and Distribution:

a. Document distribution to project members shall be accomplished both within the extranet system and via email as appropriate. Project document distribution to parties outside of the project communication system shall be accomplished by secure email of outgoing documents and attachments, readable by a standard email client.

6. Required Document Types:
   a. RFI, Request for Information.
   b. Submittals, including record numbering by drawing and specification section.
   c. Transmittals, including record of documents and materials delivered in hard copy.
   d. Meeting Minutes.
   e. Application for Payments (Draft or Pencil).
   f. Review Comments.
   g. Field Reports.
   h. Construction Photographs.
   i. Drawings.
   j. Supplemental Sketches.
   k. Schedules.
   l. Specifications.
   m. Request for Proposals
   n. Designer's Supplemental Instructions
   o. Punch Lists

H. Record Keeping: Except for paper documents, which require original signatures and large format documents (greater than 8½ x 11 inches), all other 8½ x 11 inches documents shall be submitted by transmission in electronic form to the Trimble Unity Construct® (Formerly eBuilder) web site by licensed users.
   a. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Subcontractors and suppliers at every tier shall respond to documents received in electronic form on the web site and consider them as if received in paper document form.
   b. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Subcontractors and suppliers at every tier reserves the right to and shall reply or respond by transmissions in electronic form on the web site to documents actually received in paper document form.
   c. The Owner and his representatives, the Designer and his consultants, and the Contractor and his Subcontractors and suppliers at every tier reserves the right to and shall copy any paper document into electronic form and make same available on the web site.

I. Minimum Equipment and Internet Connection: In addition to other requirements specified in this Section, the Owner and his representatives, the Construction Manager and his representatives, the Architect and his consultants, and the Contractor and his sub-contractors and suppliers at every tier required to have a user license(s) shall be responsible for the following:

1. Providing suitable computer systems for each licensed user at the users normal work location[1] with high-speed Internet access, i.e. DSL, local cable company's Internet connection, or T1 connection.
2. Each of the above referenced computer systems shall have the following minimum system[2] and software requirements:
    a. Desktop configuration (Laptop configurations are similar and should be equal to or exceed desktop system.)
        1) Operating System: Windows XP or newer
        2) Internet Browser: Internet Explorer 6.01SP2+ (Recommend IE7.0+)
        3) Minimum Recommend Connection Speed: 256K or above
        4) Processor Speed: 1 Gigahertz and above
        5) RAM: 512 mb
        6) Operating system and software shall be properly licensed.
        7) Internet Explorer version 7 (current version is a free distribution for download). This specification is not intended to restrict the host server or client computers provided that industry standard HTTP clients may access the published content.
        8) Adobe Acrobat Reader (current version is a free distribution for download).
        9) Users should have the standard Microsoft Office Suite (current version must be purchased) or the equivalent.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable.)

END OF SECTION 013115

[1] The normal work location is the place where the user is assigned for more than one-half of his time working on this project.
[2] The minimum system herein will not be sufficient for many tasks and may not be able to process all documents and files stored in the Trimble Unity Construct® (Formerly eBuilder) Documents area.

SECTION 013200 – SCHEDULE – BAR CHART

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for a Bar Chart Schedule for the project construction activities, schedule of submittals, and schedule for testing.

PART 2 - PRODUCTS – (Not Applicable)

PART 3 - EXECUTION

3.1 SUBMITTAL PROCEDURES

A. The Contractor shall submit to the Designer, within ten (10) working days following the Notice to Proceed, a Progress Schedule including Schedule of Values showing the rate of progress the Contractor agrees to maintain and the order in which he proposed to carry out the various phases of Work. No payments shall be made to the Contractor until the Progress Schedule has been approved by the Owner.

1. The Schedule of Values must have the following line items included with the value of the item as indicated below:

    a. O&M's (Owner's Manual)

        1) $1,000,000.00 (One million) and under – 2% of the total contract amount

        2) Over $1,000,000.00 (One million) – 1% of the total contract amount

    b. Close Out Documents

        1) $1,000,000.00 (One million) and under – 2% of the total contract amount

        2) Over $1,000,000.00 (One million) – 1% of the total contract amount

    c. General Conditions

        1) No more than 10%

B. The Contractor shall submit an updated Schedule for presentation at each Monthly Progress Meeting. The Schedule shall be updated by the Contractor as necessary to reflect the current Schedule and its relationship to the original Schedule. The updated Schedule shall reflect any changes in the logic, sequence, durations, or completion date. Payments to the Contractor shall be suspended if the Progress Schedule is not adequately updated to reflect actual conditions.

C. The Contractor shall submit Progress Schedules to Subcontractors to permit coordinating their Progress Schedules to the general construction Work. The Contractor shall coordinate preparation and processing of Schedules and reports with performance of other construction activities.

3.2 CONSTRUCTION PROGRESS SCHEDULE – BAR CHART SCHEDULE

A. Bar-Chart Schedule: The Contractor shall prepare a comprehensive, fully developed, horizontal bar chart-type Contractor's Construction Schedule. The Contractor for general construction shall prepare the Construction Schedule for the entire Project. The Schedule shall show the percentage of work to be completed at any time, anticipated monthly payments by Owner, as well as significant dates (such as completion of excavation, concrete foundation work, underground lines, superstructure, rough-ins, enclosure, hanging of fixtures, etc.) which shall serve as check points to determine compliance with the approved Schedule. The Schedule shall also include an activity for the number of "bad" weather days specified in Section 012100 – Allowances.

1. The Contractor shall provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week.

    a. If practical, use the same Schedule of Values breakdown for schedule time bars.

2. The Contractor shall provide a base activity time bar showing duration for each construction activity. Each bar is to indicate start and completion dates for the activity. The Contractor is to place a contrasting bar below each original schedule activity time for indicating actual progress and planned remaining duration for the activity.

3. The Contractor shall prepare the Schedule on a minimal number of separate sheets to readily show the data for the entire construction period.

4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on schedule with other construction activities. Include minor elements involved in the overall sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.

5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other required schedules and reports.

6. Indicate the Intent to Award and the Contract Substantial Completion dates on the schedule.

B. Phasing: Provide notations on the schedule to show how the sequence of the Work is affected by the following:

1. Requirement for Phased completion

2. Work by separate Contractors

3. Work by the Owner

4. Pre-purchased materials

5. Coordination with existing construction

6. Limitations of continued occupancies

7. Un-interruptible services
8. Partial Occupancy prior to Substantial Completion
9. Site restrictions
10. Provisions for future construction
11. Seasonal variations
12. Environmental control

C. Work Stages: Use crosshatched bars to indicate important stages of construction for each major portion of the Work. Such stages include, but are not necessarily limited to, the following:

1. Subcontract awards
2. Submittals
3. Purchases
4. Mockups
5. Fabrication
6. Sample testing
7. Deliveries
8. Installation
9. Testing
10. Adjusting
11. Curing
12. Startup and placement into final use and operation

D. Area Separations: Provide a separate time bar to identify each major area of construction for each major portion of the Work. For the purposes of this Article, a "major area" is a story of construction, a separate building, or a similar significant construction element.

1. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    a. Structural completion.
    b. Permanent space enclosure
    c. Completion of mechanical installation
    d. Completion of the electrical portion of the Work
    e. Substantial Completion

3.3 SCHEDULE OF SUBMITTALS

A. Upon acceptance of the Construction Progress Schedule, prepare and submit a complete schedule of submittals. Coordinate the submittal schedule with Section 013300 SUBMITTALS, the approved Construction Progress Schedule, list of subcontracts, Schedule of Values and the list of products.

B. Prepare the schedule in chronological order. Provide the following information

1. Scheduled date for the first submittal
2. Related Section number
3. Submittal category
4. Name of the Subcontractor
5. Description of the part of the Work covered
6. Scheduled date for resubmittal
7. Scheduled date for the Designer's final release or approval

C. Distribution: Following the Designer's response to the initial submittal schedule, print and distribute copies to the Designer, Owner, subcontractors, and other parties required to comply with submittal dates indicated.

1. Post copies in the Project meeting room and temporary field office.
2. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned part of the Work and are no longer involved in construction activities.

D. Schedule Updating: Revise the schedule after each meeting or other activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

3.4 SCHEDULE OF INSPECTIONS AND TESTS

A. Prepare a schedule of inspections, tests, and similar services required by the Contract Documents. Submit the schedule with (15) days of the date established for commencement of the Contract Work. The Contractor is to notify the testing agency at least (5) working days in advance of the required tests unless otherwise specified.

B. Form: This schedule shall be in tabular form and shall include, but not be limited to, the following:

1. Specification Section number
2. Description of the test
3. Identification of applicable standards
4. Identification of test methods
5. Number of tests required
6. Time schedule or time span for tests
7. Entity responsible for performing tests
8. Requirements for taking samples
9. Unique characteristics of each service

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

END OF SECTION 013200

SECTION 013300 – SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.

B. Division 1, Section 013115 “Project Management Communications” for administrative requirements for communications.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of the Work including the following:

1. Shop Drawings
2. Product Data
3. Samples
4. Quality Assurance Submittals
5. Construction Photographs
6. Operating and Maintenance Manuals
7. Warranties

B. Administrative Submittals: Refer to General and Supplementary Conditions other applicable Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:

1. Construction Progress Schedule including Schedule of Values
2. Performance and Payment Bonds
3. Insurance Certificates
4. Applications for Payment
5. Certified Payroll Reports
6. Partial and Final Receipt of Payment and Release Forms
7. Affidavit – Compliance with Prevailing Wage Law
8. Record Drawings
9. Notifications, Permits, etc.

C. The Contractor is obliged and responsible to check all shop drawings and schedules to assure compliance with contract plans and specifications. The Contractor is responsible for the content of the shop drawings and coordination with other contract work. Shop drawings and schedules shall indicate, in detail, all parts of an Item or Work including erection and setting instructions and integration with the Work of other trades.

D. The Contractor shall at all times make a copy, of all approved submittals, available on site to the Construction Representative.

1.3 SUBMITTAL PROCEDURES

A. The Contractor shall comply with the General and Supplementary Conditions and other applicable sections of the Contract Documents. The Contractor shall submit, with such promptness as to cause no delay in his work or in that of any other contractors, all required submittals indicated in Part 3.1 of this section and elsewhere in the Contract Documents. Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

    a. The Designer reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.

B. Each drawing and/or series of drawings submitted must be accompanied by a letter of transmittal giving a list of the titles and numbers of the drawings. Each series shall be numbered consecutively for ready reference and each drawing shall be marked with the following information:

1. Date of Submission

2. Name of Project

3. Location

4. Section Number of Specification

5. State Project Number

6. Name of Submitting Contractor

7. Name of Subcontractor

8. Indicate if Item is submitted as specified or as a substitution

1.4 SHOP DRAWINGS

A. Comply with the General Conditions, Article 3.2.

B. The Contractor shall submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.

C. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates, and similar drawings including the following information:

1. Dimensions

2. Identification of products and materials included by sheet and detail number

3. Compliance with specified standards

4. Notation of coordination requirements

5. Notation of dimensions established by field measurement

6. Sheet Size: Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8½”x11” but no larger than 36”x48”.

1.5 PRODUCT DATA

A. The Contractor shall comply with the General Conditions, Article 3.2.

B. The Contractor shall collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer’s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information including the following information:

   a. Manufacturer’s printed recommendations

   b. Compliance with Trade Association standards

   c. Compliance with recognized Testing Agency standards

   d. Application of Testing Agency labels and seals

   e. Notation of dimensions verified by field measurement

   f. Notation of coordination requirements

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

1.6 SAMPLES

A. The Contractor shall comply with the General Conditions, Article 3.2.

B. The Contractor shall submit full-size, fully fabricated samples, cured and finished as specified, and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.

1. The Contractor shall mount or display samples in the manner to facilitate review of qualities indicated. Prepare samples to match the Designer’s sample including the following:

   a. Specification Section number and reference

   b. Generic description of the Sample

   c. Sample source

   d. Product name or name of the Manufacturer

   e. Compliance with recognized standards

   f. Availability and delivery time

2. The Contractor shall submit samples for review of size, kind, color, pattern, and texture. Submit samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least three (3) multiple units that show approximate limits of the variations.

b. Refer to other Specification Sections for requirements for samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

c. Refer to other Sections for samples to be returned to the Contractor for incorporation in the Work. Such samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of sample submittals.

d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Field samples are full-size examples erected onsite to illustrate finishes, coatings, or finish materials and to establish the Project standard.

a. The Contractor shall comply with submittal requirements to the fullest extent possible. The Contractor shall process transmittal forms to provide a record of activity.

1.7 QUALITY ASSURANCE DOCUMENTS

A. The Contractor shall comply with the General Conditions, Article 3.2

B. The Contractor shall submit quality control submittals including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.

C. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the Manufacturer certifying compliance with specified requirements.

1. Signature: Certification shall be signed by an officer of the Manufacturer or other individual authorized to contractually bind the Company.

D. Inspection and Test Reports: The Contractor shall submit the required inspection and test reports from independent testing agencies as specified in this Section and in other Sections of the Contract Documents.

E. Construction Photographs: The Contractor shall submit record construction photographs as specified in this Section and in other Sections of the Contract Documents.

1. The Contractor shall submit digital photographs. The Construction Administrator shall determine the quantity and naming convention at the preconstruction meeting.

2. The Contractor shall identify each photograph with project name, location, number, date, time, and orientation.

3. The Contractor shall submit progress photographs monthly unless specified otherwise. Photographs shall be taken one (1) week prior to submitting.

4. The Contractor shall take four (4) site photographs from differing directions and a minimum of five (5) interior photographs indicating the relative progress of the Work.

1.8 OPERATING AND MAINTENANCE MANUALS AND WARRANTIES

A. The Contractor shall submit all required manufacturer's operating instructions, maintenance/service manuals, and warranties in accordance with the General Conditions, Article 3.5, and Supplementary Conditions along with this and other Sections of the Contract Documents.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REQUIRED SUBMITTALS

A. Contractor shall submit the following information for materials and equipment to be provided under this contract.

013200	Schedules	Construction Schedule
013200	Schedules	Schedule of Values
013200	Schedules	List of Subcontractors
013200	Schedules	Major Material Suppliers
031000	Concrete Forming and Accessories	Product Data
031000	Concrete Forming and Accessories	Shop Drawings
031000	Concrete Forming and Accessories	Sample
031000	Concrete Forming and Accessories	Certification
031523	Underslab Vapor Barrier	Product Data
031523	Underslab Vapor Barrier	Sample
033000	Mix Design	Shop Drawings
033000	Reinforcing Shop Drawings	Shop Drawings
033000	Cast-In-Place Concrete	Product Data
033000	Slab Reinforcing Shop Drawings	Shop Drawings
033005	Moisture Vapor Reducing Admixture	Product Data
033005	Moisture Vapor Reducing Admixture	Test Report
033005	Moisture Vapor Reducing Admixture	Certification
033005	Moisture Vapor Reducing Admixture	Warranty
035216	Lightweight Insulating Concrete	Shop Drawings
035216	Lightweight Insulating Concrete	Product Data
035216	Lightweight Insulating Concrete	Certification
042200	Reinforcing Steel and Placement Shop Drawings	Shop Drawings
042200	Mortar Mix Design	Product Data
042200	Grout Mix Design	Product Data
042200	CMU Block / Accessories	Product Data
047200	Cast Stone Masonry	Product Data

047200	Cast Stone Masonry	Shop Drawings
047200	Cast Stone Masonry	Sample
047200	Cast Stone Masonry	Certification
047300	Manufactured Stone Masonry	Product Data
047300	Manufactured Stone Masonry	Shop Drawings
047300	Manufactured Stone Masonry	Sample
047300	Manufactured Stone Masonry	Certification
047300	Manufactured Stone Masonry	Warranty
051200	Base Plate and Anchor Bolt Shop Drawings	Shop Drawings
051200	Structural Steel Shop Drawings	Shop Drawings
051200	Fabricator Qualifications	Major Material Suppliers
051200	Structural Steel Framing Delegated Design	Shop Drawings
052100	Joist and Joist Girder	Shop Drawings
052100	Steel Joist Framing	Fabricator Qualifications
053100	Steel Decking	Shop Drawings
053100	Steel Decking Fabricator Qualifications	Major Material Suppliers
054000	Cold-Formed Metal Framing	Product Data
054000	Cold-Formed Metal Framing	Shop Drawings
054000	Cold-Formed Metal Framing	Certification
054000	Cold-Formed Metal Framing - Delegated Design	Shop Drawings
054300	Slotted Channel Framing	Shop Drawings
054300	Slotted Channel Framing	Product Data
054400	Cold-Formed Metal Trusses - Delegated Design	Shop Drawings
055000	Metal Fabrications	Shop Drawings
055000	Metal Fabrications	Certification
055013	Pipe Bollards	Shop Drawings
055013	Pipe Bollards	Product Data
055013	Pipe Bollards	Sample
055133	Metal Ladders	Shop Drawings
055133	Metal Ladders	Certification
055133	Metal Ladders	Warranty
061000	Rough Carpentry	Product Data
061000	Rough Carpentry	Certification
061000	Rough Carpentry	Warranty
061500	Plywood Sheathing	Product Data
061600	Glass Mat Gypsum Sheathing	Product Data
061600	Glass Mat Gypsum Sheathing	Shop Drawings
061600	Glass Mat Gypsum Sheathing	Test Report
061611	Sheathing Hunter	Sample
061611	Sheathing Hunter	Certification
061611	Sheathing Hunter	Warranty
062000	Finish Carpentry	Product Data
062000	Finish Carpentry	Shop Drawings
062000	Finish Carpentry	Certification
066116	Solid Surface Fabrications	Shop Drawings

066116	Solid Surface Fabrications	Product Data
066116	Solid Surface Fabrications	Operation / Maintenance Manual
066116	Solid Surface Fabrications	Warranty
070553	Fire and Smoke Identification	Product Data
070553	Fire and Smoke Identification	Schedule of Values
070553	Fire and Smoke Identification	Sample
072100	Thermal Insulation	Product Data
072100	Thermal Insulation	Certification
072100	Thermal Insulation	Test Report
072160	Structural Thermal Break	Product Data
072160	Structural Thermal Break	Shop Drawings
072160	Structural Thermal Break	Sample
072160	Structural Thermal Break	Certification
072160	Structural Thermal Break	Test Report
072160	Structural Thermal Break	Warranty
072700	Air Barriers	Product Data
074113.16	Standing Seam Roof Panels	Product Data
074113.16	Standing Seam Roof Panels	Shop Drawings
074113.16	Standing Seam Roof Panels	Sample
074113.16	Standing Seam Roof Panels	Certification
074113.16	Standing Seam Roof Panels	Test Report
074113.16	Standing Seam Roof Panels	Warranty
074616	Linear Metal Panels	Product Data
074616	Linear Metal Panels	Shop Drawings
074616	Linear Metal Panels	Sample
074616	Linear Metal Panels	Warranty
074646	Fiber Cement Cladding	Product Data
074646	Fiber Cement Cladding	Shop Drawings
074646	Fiber Cement Cladding	Test Report
074646	Fiber Cement Cladding	Warranty
075423	TPO Roofing	Product Data
075423	TPO Roofing	Shop Drawings
075423	TPO Roofing	Certification
075423	TPO Roofing	Warranty
076200	Sheet Metal Flashing	Shop Drawings
077123	Scuppers Gutters Downspouts	Product Data
077123	Scuppers Gutters Downspouts	Shop Drawings
077200	Roof Accessories	Product Data
077200	Roof Accessories	Shop Drawings
077200	Roof Accessories	Warranty
078400	Firestopping	Product Data
078400	Firestopping	Certification
078400	Firestopping	Test Report
079200	Joint Sealants	Product Data
079200	Joint Sealants	Sample
079200	Joint Sealants	Test Report

079200	Joint Sealants	Warranty
081113	Hollow Metal Doors and Frames	Product Data
081113	Hollow Metal Doors and Frames	Shop Drawings
081113	Hollow Metal Doors and Frames	Certification
081169	FEMA Metal Storm Doors	Product Data
081169	FEMA Metal Storm Doors	Shop Drawings
081169	FEMA Metal Storm Doors	Certification
081213	Metal Frames for Wood Doors	Product Data
081213	Metal Frames for Wood Doors	Shop Drawings
081416	Flush Wood Doors	Product Data
081416	Flush Wood Doors	Shop Drawings
081416	Flush Wood Doors	Sample
081416	Flush Wood Doors	Warranty
083300.13	FEMA Rolling Doors	Product Data
083300.13	FEMA Rolling Doors	Shop Drawings
083300.13	Operation and Maintenance	Operation / Maintenance Manual
083300.13	FEMA Rolling Doors	Warranty
083613	Sectional Overhead Doors	Product Data
083613	Sectional Overhead Doors	Shop Drawings
083613	Operation and Maintenance	Operation / Maintenance Manual
083613	Sectional Overhead Doors	Warranty
084313	Storefronts	Product Data
084313	Storefronts	Shop Drawings
084413	Curtain Walls	Shop Drawings
085800	Pass Window Assemblies	Product Data
085800	Pass Window Assemblies	Shop Drawings
087100	Door Hardware	Product Data
087100	Door Hardware	Shop Drawings
087100	Operation and Maintenance	Operation / Maintenance Manual
087100	Door Hardware	Warranty
088000	Glazing	Product Data
088000	Glazing	Warranty
088300	Mirrors	Product Data
088300	Mirrors	Warranty
088723	Security Films	Product Data
088723	Security Films	Shop Drawings
088723	Security Films	Warranty
099413	Textured Acrylic Color Surfacing	Product Data
099413	Textured Acrylic Color Surfacing	List of Subcontractors
107516	Ground -Set Flagpoles	Product Data
107516	Ground -Set Flagpoles	Shop Drawings
107516	Ground -Set Flagpoles	Operation / Maintenance Manual
107516	Ground -Set Flagpoles	Warranty
116800	Exercise Equipment and Structures	Product Data

116800	Exercise Equipment and Structures	Shop Drawings
116800	Exercise Equipment and Structures	Operation / Maintenance Manual
116800	Exercise Equipment and Structures	Warranty
211300	FIRE-SUPPRESSION SPRINKLER SYSTEMS	Product Data
211300	FIRE-SUPPRESSION SPRINKLER SYSTEMS	Shop Drawings
211300	FIRE-SUPPRESSION SPRINKLER SYSTEMS	Test Report
211300	FIRE-SUPPRESSION SPRINKLER SYSTEMS	Warranty
211300	FIRE-SUPPRESSION SPRINKLER SYSTEMS	As-Builts
211300	FIRE-SUPPRESSION SPRINKLER SYSTEMS	Operation / Maintenance Manual
220517	SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING	Product Data
220518	ESCUTCHEONS FOR PLUMBING PIPING	Product Data
220519	METERS AND GAGES FOR PLUMBING PIPING	Product Data
220519	METERS AND GAGES FOR PLUMBING PIPING	Operation / Maintenance Manual
220523	GENERAL-DUTY VALVES FOR PLUMBING PIPING	Product Data
220523	GENERAL-DUTY VALVES FOR PLUMBING PIPING	Operation / Maintenance Manual
220529	HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT	Product Data
220719	PLUMBING PIPING INSULATION	Product Data
221113	Facility Water Distribution Piping	Product Data
221114	FACILITY NATURAL GAS PIPING	Product Data
221116	DOMESTIC WATER PIPING	Product Data
221119	DOMESTIC WATER PIPING SPECIALTIES	Product Data
221123	IN-LINE DOMESTIC WATER PUMPS	Product Data
221123	IN-LINE DOMESTIC WATER PUMPS	Warranty
221123	IN-LINE DOMESTIC WATER PUMPS	Operation / Maintenance Manual
221313	Facility Sanitary Sewers	Product Data
221313	Facility Sanitary Sewers	Shop Drawings
221316	SANITARY WASTE AND VENT PIPING	Product Data
221319	SANITARY WASTE AND VENT PIPING SPECIALTIES	Product Data
2231323	SANITARY WASTE INTERCEPTORS	Product Data
2231323	SANITARY WASTE INTERCEPTORS	Operation / Maintenance Manual
223400	FUEL-FIRED DOMESTIC HOT-WATER HEATERS	Product Data

223400	FUEL-FIRED DOMESTIC HOT-WATER HEATERS	Warranty
223400	FUEL-FIRED DOMESTIC HOT-WATER HEATERS	Operation / Maintenance Manual
224000	PLUMBING FIXTURES	Product Data
224000	PLUMBING FIXTURES	Warranty
224000	PLUMBING FIXTURES	Operation / Maintenance Manual
230517	SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	Product Data
230517	SLEEVES AND SLEEVE SEALS FOR HVAC PIPING	Test Report
230518	ESCUTCHEONS FOR HVAC PIPING	Product Data
230519	METERS AND GAGES FOR HVAC PIPING	Product Data
230519	METERS AND GAGES FOR HVAC PIPING	Certification
230519	METERS AND GAGES FOR HVAC PIPING	Operation / Maintenance Manual
230523	GENERAL-DUTY VALVES FOR HVAC PIPING	Product Data
230529	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT	Product Data
230529	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT	Shop Drawings
230529	HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT	Certification
230548.13	VIBRATION CONTROLS FOR HVAC	Product Data
230548.13	VIBRATION CONTROLS FOR HVAC	Shop Drawings
230548.13	VIBRATION CONTROLS FOR HVAC	Certification
230548.13	VIBRATION CONTROLS FOR HVAC	Test Report
230553	IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT	Product Data
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	Certification
230593	TESTING, ADJUSTING, AND BALANCING FOR HVAC	Test Report
230713	DUCT INSULATION	Product Data
230713	DUCT INSULATION	Shop Drawings
230713	DUCT INSULATION	Test Report
230716	HVAC EQUIPMENT INSULATION	Product Data
230716	HVAC EQUIPMENT INSULATION	Shop Drawings
230716	HVAC EQUIPMENT INSULATION	Sample
230716	HVAC EQUIPMENT INSULATION	Test Report
230719	HVAC PIPING INSULATION	Product Data
230719	HVAC PIPING INSULATION	Certification
230719	HVAC PIPING INSULATION	Sample
230719	HVAC PIPING INSULATION	Shop Drawings
230719	HVAC PIPING INSULATION	Test Report

230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	Certification
230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	Product Data
230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	Shop Drawings
230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	As-Builts
230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	Test Report
230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	Operation / Maintenance Manual
230923	DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC	Warranty
230923.11	CONTROL VALVES	Product Data
230923.11	CONTROL VALVES	Shop Drawings
230923.11	CONTROL VALVES	Operation / Maintenance Manual
232113	HYDRONIC PIPING	Product Data
232113	HYDRONIC PIPING	Certification
232113	HYDRONIC PIPING	Shop Drawings
232113	HYDRONIC PIPING	As-Builts
232113	HYDRONIC PIPING	Test Report
232116	HYDRONIC PIPING SPECIALTIES	Product Data
232116	HYDRONIC PIPING SPECIALTIES	Operation / Maintenance Manual
232123	HYDRONIC PUMPS	Product Data
232123	HYDRONIC PUMPS	Shop Drawings
232123	HYDRONIC PUMPS	Test Report
232123	HYDRONIC PUMPS	Operation / Maintenance Manual
232123	HYDRONIC PUMPS	Warranty
232513	WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS	Product Data
232513	WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS	Certification
232513	WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS	Shop Drawings
232513	WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS	Test Report
232513	WATER TREATMENT FOR CLOSED-LOOP HYDRONIC SYSTEMS	Operation / Maintenance Manual
233113	METAL DUCTS	Product Data
233113	METAL DUCTS	Shop Drawings
233113	METAL DUCTS	Certification
233113	METAL DUCTS	Test Report
233113	METAL DUCTS	As-Builts
233300	AIR DUCT ACCESSORIES	Product Data

233300	AIR DUCT ACCESSORIES	Shop Drawings
233300	AIR DUCT ACCESSORIES	Test Report
233300	AIR DUCT ACCESSORIES	Operation / Maintenance Manual
233346	FLEXIBLE DUCTS	Product Data
233346	FLEXIBLE DUCTS	Shop Drawings
233423	HVAC POWER VENTILATORS	Product Data
233423	HVAC POWER VENTILATORS	Shop Drawings
233423	HVAC POWER VENTILATORS	Test Report
233423	HVAC POWER VENTILATORS	Operation / Maintenance Manual
233423	HVAC POWER VENTILATORS	Warranty
233533	LISTED KITCHEN VENTILATION SYSTEM EXHAUST DUCTS	Product Data
233533	LISTED KITCHEN VENTILATION SYSTEM EXHAUST DUCTS	Shop Drawings
233533	LISTED KITCHEN VENTILATION SYSTEM EXHAUST DUCTS	Certification
233533	LISTED KITCHEN VENTILATION SYSTEM EXHAUST DUCTS	Test Report
233713	AIR DIFFUSERS, REGISTERS AND GRILLES	Product Data
233713	AIR DIFFUSERS, REGISTERS AND GRILLES	Sample
233713.43	SECURITY REGISTERS AND GRILLES	Product Data
233713.43	SECURITY REGISTERS AND GRILLES	Shop Drawings
233813	COMMERCIAL-KITCHEN HOODS	Product Data
233813	COMMERCIAL-KITCHEN HOODS	Shop Drawings
233813	COMMERCIAL-KITCHEN HOODS	Certification
233813	COMMERCIAL-KITCHEN HOODS	Test Report
233813	COMMERCIAL-KITCHEN HOODS	Operation / Maintenance Manual
235123	GAS VENTS	Product Data
235123	GAS VENTS	Shop Drawings
235123	GAS VENTS	Certification
235216	CONDENSING BOILERS	Product Data
235216	CONDENSING BOILERS	Shop Drawings
235216	CONDENSING BOILERS	Certification
235216	CONDENSING BOILERS	Test Report
235216	CONDENSING BOILERS	Warranty
235216	CONDENSING BOILERS	Operation / Maintenance Manual
236423.13	AIR-COOLED, SCROLL WATER CHILLERS	Product Data
236423.13	AIR-COOLED, SCROLL WATER CHILLERS	Shop Drawings
236423.13	AIR-COOLED, SCROLL WATER CHILLERS	Certification
236423.13	AIR-COOLED, SCROLL WATER CHILLERS	Test Report
236423.13	AIR-COOLED, SCROLL WATER CHILLERS	Warranty
236423.13	AIR-COOLED, SCROLL WATER CHILLERS	Operation / Maintenance Manual
237433	DEDICATED OUTDOOR-AIR UNITS	Product Data
237433	DEDICATED OUTDOOR-AIR UNITS	Shop Drawings
237433	DEDICATED OUTDOOR-AIR UNITS	Warranty

237433	DEDICATED OUTDOOR-AIR UNITS	Test Report
237433	DEDICATED OUTDOOR-AIR UNITS	Operation / Maintenance Manual
238126	SPLIT-SYSTEM AIR-CONDITIONERS	Product Data
238126	SPLIT-SYSTEM AIR-CONDITIONERS	Shop Drawings
238126	SPLIT-SYSTEM AIR-CONDITIONERS	Warranty
238126	SPLIT-SYSTEM AIR-CONDITIONERS	Test Report
238126	SPLIT-SYSTEM AIR-CONDITIONERS	Operation / Maintenance Manual
238219	FAN COIL UNITS	Product Data
238219	FAN COIL UNITS	Shop Drawings
238219	FAN COIL UNITS	Warranty
238219	FAN COIL UNITS	Test Report
238219	FAN COIL UNITS	Operation / Maintenance Manual
238239.19	WALL AND CEILING UNIT HEATERS	Product Data
238239.19	WALL AND CEILING UNIT HEATERS	Shop Drawings
238239.19	WALL AND CEILING UNIT HEATERS	Sample
238239.19	WALL AND CEILING UNIT HEATERS	Warranty
238239.19	WALL AND CEILING UNIT HEATERS	Test Report
238239.19	WALL AND CEILING UNIT HEATERS	Operation / Maintenance Manual
260519	LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS	Product Data
260526	GROUNDING AND BONDING	Product Data
260529	HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS	Product Data
260533	RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS	Product Data
260544	SLEEVES AND SLEEVE SEALS FOR ELECTRICAL SYSTEMS	Product Data
260573	OVERCURRENT PROTECTIVE DEVICE COORDINATION	Test Report
260573	OVERCURRENT PROTECTIVE DEVICE COORDINATION	Operation / Maintenance Manual
260936	MODULAR DIMMING CONTROLS	Product Data
260936	MODULAR DIMMING CONTROLS	Shop Drawings
260936	MODULAR DIMMING CONTROLS	Warranty
260936	MODULAR DIMMING CONTROLS	Operation / Maintenance Manual
262213	LOW-VOLTAGE TRANSFORMERS	Product Data
262213	LOW-VOLTAGE TRANSFORMERS	Warranty
262213	LOW-VOLTAGE TRANSFORMERS	Operation / Maintenance Manual
262416	PANELBOARDS	Product Data

262416	PANELBOARDS	Warranty
262416	PANELBOARDS	Operation / Maintenance Manual
262726	WIRING DEVICES	Product Data
262726	WIRING DEVICES	Warranty
262726	WIRING DEVICES	Operation / Maintenance Manual
262813	FUSES	Product Data
262813	FUSES	Warranty
262813	FUSES	Operation / Maintenance Manual
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	Product Data
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	Warranty
262816	ENCLOSED SWITCHES AND CIRCUIT BREAKERS	Operation / Maintenance Manual
263213	DIESEL-ENGINE-DRIVEN GENERATOR SETS	Product Data
263213	DIESEL-ENGINE-DRIVEN GENERATOR SETS	Shop Drawings
263213	DIESEL-ENGINE-DRIVEN GENERATOR SETS	Warranty
263213	DIESEL-ENGINE-DRIVEN GENERATOR SETS	Operation / Maintenance Manual
263600	TRANSFER SWITCHES	Product Data
263600	TRANSFER SWITCHES	Warranty
263600	TRANSFER SWITCHES	Operation / Maintenance Manual
265119	LED INTERIOR LIGHTING	Product Data
265119	LED INTERIOR LIGHTING	Shop Drawings
265119	LED INTERIOR LIGHTING	Warranty
265119	LED INTERIOR LIGHTING	Operation / Maintenance Manual
265600	LED EXTERIOR LIGHTING	Product Data
265600	LED EXTERIOR LIGHTING	Warranty
265600	LED EXTERIOR LIGHTING	Operation / Maintenance Manual
284621	ADDRESSABLE FIRE ALARM SYSTEMS	Product Data
284621	ADDRESSABLE FIRE ALARM SYSTEMS	Shop Drawings
284621	ADDRESSABLE FIRE ALARM SYSTEMS	Warranty
284621	ADDRESSABLE FIRE ALARM SYSTEMS	Operation / Maintenance Manual
312000	Earth Moving	Product Data
321216	Asphalt Paving	Product Data
321313	Concrete Paving	Product Data
321373	Concrete Paving Joint Sealants	Product Data
323100	Fences and Gates	Product Data
323300	Site Furnishings	Product Data

323300	Site Furnishings	Shop Drawings
323300	Site Furnishings	Sample
323300	Site Furnishings	Warranty
329113	Soil Preparation	Test Report
329113	Soil Preparation	Product Data
329113	Soil Preparation	Sample
329200	Turf and Grasses	Product Data
329300	Plants	Product Data
329300	Plants	Warranty
329300	Plants	Sample
329300	Plants	Operation / Maintenance Manual
334100	Storm Utility Drainage Piping	Product Data
334100	Storm Utility Drainage Piping	Shop Drawings

END OF SECTION 013300

SECTION 013513.16 - SITE SECURITY AND HEALTH REQUIREMENTS (DOC)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes general Institution rules.

B. This Section includes requirements for environments that Clients are housed in, dine in, or participate in program activities in or adjacent to the Scope of Work area:

1. The Contractor shall have the applicable measures specified below in-place any time demolition or construction activities occur in occupied or non-occupied project work areas.
2. The Contractor shall complete all specified cleaning procedures and receive clearance from the Construction Representative prior to removing any barriers and other precautionary measures – even for areas that the Clients do not occupy during construction.

1.3 SUBMITTALS

A. List of required submittals:

1. Materials Safety Data Sheets for all hazardous materials to be brought onsite.
2. Schedule of proposed shutdowns, if applicable.
3. Revise list to include all required submittals.
4. A list of the names of all employees who will submit fingerprints for a background check, and the signed privacy documents identified below for each employee.
5. Tuberculin skin test results for all employees required to be tested as set forth below.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ACCESS TO THE SITE

A. The Contractor shall arrange with Facility Representatives to establish procedures for the controlled entry of workers and materials into the work areas at the Facility.

B. The Contractor shall establish regular working hours with Facility Representatives. The Contractor must report changes in working hours or overtime to Facility Representatives and obtain approval twenty-four (24) hours ahead of time. The Contractor shall report emergency overtime to Facility Representatives as soon as it is evident that overtime is needed. The

Contractor must obtain approval from Facility Representatives for all work performed after dark.

C. The Contractor shall provide the name and phone number of the Contractor's employee or agent who is in charge onsite; this individual must be able to be contacted in case of emergency. The Contractor must be able to furnish names and address of all employees upon request.

D. The Contractor shall provide Facility Representatives notice twenty-four (24) hours prior to any possible vehicle entry and/or required escort. The Contractor shall maintain a time log of any delays in gaining entrance to the Facility due to lack of an escort, which is to be submitted monthly with the Contractor's pay request materials. The purpose of this log is to establish a basis for a contract change, if required. The log shall contain the date and time of delay, date and time of request of entry, workers delayed (name and occupation), and name of the Facility Representative to whom the request was made, if possible. Any delay in entry must be validated by sallyport and pass office personnel at the Facility. Only delays greater than thirty (30) minutes will be considered for a contract change. A 30-minute delay upon arrival with a vehicle to enter the sallyport should be expected.

3.2 RULES OF THE FACILITY

A. The Contractor and its workers shall observe the following rules:

1. There shall be no fraternization with inmates.
2. No intoxicating beverages or illegal drugs shall be brought onto Facility grounds.
3. No firearms, other weapons, or explosives shall be carried onto Facility grounds.
4. No prescription drugs above one day's dosage shall be carried on Facility grounds.
5. Any vehicle or individual is subject to search at any time while on Facility grounds.
6. The vehicles of the Contractor and its workers shall be locked whenever unattended.
7. All tools and equipment shall be tightly secured during non-working hours in the Contractor's storage trailer or assigned area.
8. The Facility will not be responsible for the Contractor's tools, equipment, or materials. The Contractor shall keep and maintain a current tool inventory. The tool inventory shall be made available to Facility Representatives and the Owner upon request.
9. The Contractor shall report any missing tools to Facility Representatives immediately.
10. Smoking shall be permitted only in accordance with the regulations of the Facility.
11. Possession or use of smokeless tobacco or smokeless non-tobacco alternatives is strictly prohibited.

B. All workers shall be required to sign an acknowledgement of receipt of these rules.

3.3 SECURITY CLEARANCES AND RESTRICTIONS

A. DOC SECURITY CLEARANCE REQUIREMENTS

1. [**Security restrictions may vary between different Facilities. Verify and revise paragraph below if Facility requirement for construction personnel differ.**] Prior to the commencement of any onsite work, the Contractor shall submit a list containing the name, date of birth, and Missouri driver's license number or social security number of all

construction personnel to the Missouri Department of Corrections for the purpose of obtaining security clearances. The required information shall be submitted at the pre-construction meeting, or as otherwise directed by Department of Corrections' personnel. Any construction personnel with pending warrants or felony convictions within the last five (5) years or other offenses deemed to create a security risk by Department of Corrections shall not be allowed onsite. The Department of Corrections reserves the right to refuse admission to any individual they feel may be detrimental to the security of the Facility.

3.4 FIRE PROTECTION, SAFETY, AND HEALTH CONTROLS

A. The Contractor shall take all necessary precautions to guard against and eliminate possible fire hazards.

1. Onsite burning is prohibited.
2. The Contractor shall store all flammable or hazardous materials in proper containers located outside the buildings or offsite, if possible.
3. The Contractor shall provide and maintain, in good order, during construction fire extinguishers as required by the National Fire Protection Association. In areas of flammable liquids, asphalt, or electrical hazards, 15-pound carbon dioxide or 20-pound dry chemical extinguishers shall be provided.

B. The Contractor shall not obstruct streets or walks without permission from the Owner's Construction Representative and Facility Representatives.

C. The Contractor's personnel shall not exceed the speed limit of 15 mph while at the Facility unless otherwise posted.

D. The Contractor shall take all necessary, reasonable measures to reduce air and water pollution by any material or equipment used during construction. The Contractor shall keep volatile wastes in covered containers and shall not dispose of volatile wastes or oils in storm or sanitary drains.

E. The Contractor shall keep the project site neat, orderly, and in a safe condition at all times. The Contractor shall immediately remove all hazardous waste and shall not allow rubbish to accumulate. The Contractor shall provide onsite containers for collection of rubbish and shall dispose of it at frequent intervals during the progress of the Work.

F. Fire exits, alarm systems, and sprinkler systems shall remain fully operational at all times, unless written approval is received from the Owner's Construction Representative and the appropriate Facility Representative at least twenty-four (24) hours in advance. The Contractor shall submit a written time schedule for any proposed shutdowns.

G. For all hazardous materials brought onsite, Material Safety Data Sheets shall be on site and readily available upon request at least a day before delivery.

H. The Contractor's workers shall not be under the influence of any intoxicating substances while on the Facility premises.

3.5 TUBERCULOSIS TESTING REQUIREMENTS

A. All workers who will be in the confines of the Facility for more than ten (10) consecutive working days must provide proof of a negative tuberculin skin test. The test results must be no more than six (6) months old at the commencement of construction. The Contractor or the worker, not the Owner, shall pay the cost of the test.

B. The Contractor shall submit to Facility Representatives current tuberculin skin test results for all workers who are required to have such a test in accordance with paragraph A above. If the contract period extends for more than twelve (12) months, the Contractor must provide new test results for all workers prior to the anniversary of the contract commencement date.

C. Any worker required to have a tuberculin skin test under paragraph A above who fails or refuses to do so will be denied admission to the facility until such time as proof of the test results are provided.

D. If any worker has a tuberculin skin test with positive results, the worker shall be denied access to the facility until the worker produces a certification from a physician licensed to practice in the State of Missouri that the worker does not have infectious tuberculosis.

E. The Contractor shall not be entitled to any additional time or compensation if any of its workers are denied access to the facility because of failure to produce negative tuberculin skin test results.

F. Failure or refusal of the Contractor to maintain and produce the required tuberculin skin test records shall be a material breach of this contract, which shall subject the Contractor to a declaration of default.

3.6 PREA FOR CONTRACTORS AND EMPLOYEES

A. The contractor and all of the contractor’s employees and agents providing services in any Department of Corrections institution must be at least 18 years of age. A Missouri Uniform Law Enforcement System (MULES) check or other background investigation may be required on the contractor, the contractor’s employees and agents before they are allowed entry into the institution. The contractor, its employees and agents understand and agree that the Department may complete criminal background records checks annually for the contractor and the contractor’s employees and agents that have the potential to have contact with inmates.

B. The institution shall have the right to deny access into the institution for the contractor and any of the contractor’s employees and agents for any reason, at the discretion of the institution.

C. The contractor, its employees and agents under active federal or state felony or misdemeanor supervision must receive written division director approval prior to providing services pursuant to a Department contract. Similarly, contractors/employees/agents with prior felony convictions and not under active supervision must receive written division director approval in advance.

D. The contractor, its employees and agents shall at all times observe and comply with all applicable state statutes, Department rules, regulations, guidelines, internal management policies and procedures, and general orders of the Department that are applicable, regarding operations and activities in and about all Department property. Furthermore, the contractor, its

employees and agents, shall not obstruct the Department or any of its designated officials from performing their duties in response to court orders or in the maintenance of a secure and safe correctional environment. The contractor shall comply with the Department's policies and procedures relating to employee conduct.

1. The Department has a zero-tolerance policy for any form of sexual misconduct to include staff/contractor/volunteer on offender, or offender on offender, sexual harassment, sexual assault, sexual abuse and consensual sex.

    a. Any contractor or contractor's employee or agent who witnesses any form of sexual misconduct must immediately report it to the warden of the institution. If a contractor or contractor's employee or agent fails to report or knowingly condones sexual harassment or sexual contact with or between offenders, the Department may cancel the contract, or at the Department's sole discretion, require the contractor to remove the employee/agent from providing services under the contract.
    b. Any contractor or contractor's employee or agent who engages in sexual abuse shall be prohibited from entering the institution and shall be reported to law enforcement agencies and licensing bodies, as appropriate.

E. The contractor, its employees and agents shall not interact with the offenders except as is necessary to perform the requirements of the contract. The contractor, its employees and agents shall not give anything to nor accept anything from the offenders except in the normal performance of the contract.

F. If any contractor or contractor's employee or agent is denied access into the institution for any reason or is denied approval to provide service to the Department for any reason stated herein, it shall not relieve the contractor of any requirements of the contract. If the contractor is unable to perform the requirements of the contract for any reason, the contractor shall be considered in breach.

3.7 DISRUPTION OF UTILITIES

A. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and the Facility Representative before disconnecting electric, gas, water, fire protection, or sewer service to any building.

B. The Contractor shall give a minimum of seventy-two (72) hours written notice to the Construction Representative and Facility Representative before closing any access drives, and shall make temporary access available, if possible. The Contractor shall not obstruct streets, walks, or parking

3.8 CELL PHONES AND ELECTRONIC DEVICES

A. Cell Phones, pagers, smart watches (that can send/receive messages), fitness wrist bands (that can send/receive messages) or other electronic devices are not permitted.

1. Contractors, repairpersons, or information technology services department staff may be permitted to bring in a cell phone and portable wireless router (Wi-Fi, MiFi, etc.) if

approved by the Chief Administrative Officer (CAO) when the phone is necessary to complete job duties relating to repairs on a case-by-case basis.

2. Tables (IPad, etc.) are not allowed with the exception of for re-entry purposes approved via the division of adult institutions (DAI) director and the re-entry manager.
3. Laptop computers may be permitted by the CAO on a case-by-case basis.

3.9 PROTECTION OF PERSONS AND PROPERTY

A. SAFETY PRECAUTIONS AND PROGRAMS

1. The Contractor shall at all times conduct operations under this Contract in a manner to avoid the risk of bodily harm to persons or risk of damage to any property. The Contractor shall promptly take precautions which are necessary and adequate against conditions created during the progress of the Contractor's activities hereunder which involve a risk of bodily harm to persons or a risk of damage to property. The Contractor shall continuously inspect Work, materials, and equipment to discover and determine any such conditions and shall be solely responsible for discovery, determination, and correction of any such conditions. The Contractor shall comply with applicable safety laws, standards, codes, and regulations in the jurisdiction where the Work is being performed, specifically, but without limiting the generality of the foregoing, with rules regulations, and standards adopted pursuant to the Williams-Steiger Occupational Safety and Health Act of 1970 and applicable amendments.
2. All contractors, subcontractors and workers on this project are subject to the Construction Safety Training provisions 292.675 RSMo.
3. In the event the Contractor encounters on the site, material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), lead, mercury, or other material known to be hazardous, which has not been rendered harmless, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner's Representative and the Architect in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Owner's Representative and Contractor if in fact the material is asbestos or polychlorinated biphenyl (PCB) and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos or polychlorinated biphenyl (PCB), or when it has been rendered harmless by written agreement of the Owner's Representative and the Contractor. “Rendered Harmless” shall mean that levels of such materials are less than any applicable exposure standards, including but limited to OSHA regulations.

B. SAFETY OF PERSONS AND PROPERTY

1. The Contractor shall take reasonable precautions for safety of, and shall provide protection to prevent damage, injury, or loss to:

    a. clients, staff, the public, construction personnel, and other persons who may be affected thereby;
    b. the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor or the Contractor's Subcontractors of any tier; and
    c. other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

2. The Contractor shall give notices and comply with applicable laws, standards, codes, ordinances, rules, regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury, or loss.
3. The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, safeguards for safety and protection, including, but not limited to, posting danger signs and other warnings against hazards, promulgating safety regulations, and notifying owners and users of adjacent sites and utilities.
4. When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise the highest degree of care and carry on such activities under supervision of properly qualified personnel.
5. The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in this Section caused in whole or in part by the Contractor, a Subcontractor of any tier, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable, and for which the Contractor is responsible under this Section, except damage or loss attributable solely to acts or omissions of Owner or the Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's other obligations stated elsewhere in the Contract.
6. The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents, and the maintaining, enforcing and supervising of safety precautions and programs. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner's Representative and Architect. The Contractor shall hold regularly scheduled safety meetings to instruct Contractor personnel on safety practices, accident avoidance and prevention, and the Project Safety Program. The Contractor shall furnish safety equipment and enforce the use of such equipment by its employees and its subcontractors of any tier.
7. The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.
8. The Contractor shall promptly report in writing to the Owner all accidents arising out of or in connection with the Work which cause death, lost time injury, personal injury, or property damage, giving full details and statements of any witnesses. In addition, if death, serious personal injuries, or serious property damages are caused, the accident shall be reported immediately.
9. The Contractor shall promptly notify in writing to the Owner of any claims for injury or damage to personal property related to the work, either by or against the Contractor.
10. The Owner assumes no responsibility or liability for the physical condition or safety of the Work site or any improvements located on the Work site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work. The Owner shall not be required to make any adjustment in either the Contract Sum or Contract Time concerning any failure by the Contractor or any Subcontractor to comply with the requirements of this Paragraph.
11. In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences or procedures or for safety precautions and programs in connection with the Work, notwithstanding any of the rights and authority granted the Owner in the Contract Documents.
12. The Contractor shall maintain at his own cost and expense, adequate, safe and sufficient walkways, platforms, scaffolds, ladders, hoists and all necessary, proper, and adequate

equipment, apparatus, and appliances useful in carrying on the Work and which are necessary to make the place of Work safe and free from avoidable danger for clients, staff, the public and construction personnel, and as may be required by safety provisions of applicable laws, ordinances, rules regulations and building and construction codes.

END OF SECTION 013513.16

SECTION 015000 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract including General and Supplementary Conditions, Bid Form, and other Division 1 Specification Sections apply to this Section.

1.2 SUMMARY

A. This Section includes requirements for construction facilities and temporary controls including temporary utilities, support facilities, security, and protection.

B. Temporary utilities include, but are not limited to, the following:

1. Water service and distribution
2. Temporary electric power and light
3. Temporary heat
4. Ventilation
5. Telephone service
6. Sanitary facilities, including drinking water
7. Storm and sanitary sewer

C. Support facilities include, but are not limited to, the following:

1. Field offices and storage sheds
2. Temporary roads and paving
3. Dewatering facilities and drains
4. Temporary enclosures
5. Hoists and temporary elevator use
6. Temporary project identification signs and bulletin boards
7. Waste disposal services
8. Rodent and pest control
9. Construction aids and miscellaneous services and facilities

D. Security and protection facilities include, but are not limited to, to following:

1. Temporary fire protection
2. Barricades, warning signs, and lights
3. Sidewalk bridge or enclosure fence for the site
4. Environmental protection

1.3 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.

B. Implementation and Termination Schedule: Within (15) days of the date established for commencement of the Work, submit a schedule indicating implementation and termination of each temporary utility.

1.4 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations including, but not limited to, the following:

1. Building code requirements
2. Health and safety regulations
3. Utility company regulations
4. Police, fire department, and rescue squad rules
5. Environmental protection regulations

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations". ANSI A10 Series standards for "Safety Requirements for Construction and Demolition", and NECA Electrical Design Library "Temporary Electrical Facilities".

1. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code".

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist onsite.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide new materials. If acceptable to the Designer, the Contractor may use undamaged, previously used materials in serviceable condition. Provide materials suitable for use intended.

B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry".

1. For job-built temporary office, shops, and sheds within the construction area, provide UL-labeled, fire-treated lumber and plywood for framing, sheathing, and siding.

2. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sized and thicknesses indicated.

3. For fences and vision barriers, provide minimum 3/9" (9.5mm) thick exterior plywood.

4. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8" (16mm) thick exterior plywood.

C. Gypsum Wallboard: Provide gypsum wallboard on interior walls of temporary offices.

D. Roofing Materials: Provide UL Class A standard-weight asphalt shingles or UL Class C mineral-surfaced roll roofing on roofs of job-built temporary office, shops, and shed.

E. Paint: Comply with requirements of Division 9 Section "Painting".

1. For job-built temporary offices, shops, sheds, fences, and other exposed lumber and plywood, provide exterior-grade acrylic-latex emulsion over exterior primer.

2. For sign panels and applying graphics, provide exterior-grade alkyd gloss enamel over exterior primer.

3. For interior walls of temporary offices, provide two (2) quarts interior latex-flat wall paint.

F. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of (15) or less. For temporary enclosures, provide translucent, nylon-reinforced laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.

G. Water: Provide potable water approved by local health authorities.

H. Open-Mesh Fencing: Provide 0.120" (3mm) thick, galvanized 2" (50mm) chainlink fabric fencing 6' (2m) high with galvanized steel pipe posts, 1½" (38mm) ID for line posts and 2½" (64mm) ID for corner posts.

2.2 EQUIPMENT

A. General: Provide new equipment. If acceptable to the Designer, the Contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.

B. Water Hoses: Provide ¾" (19mm), heavy-duty, abrasion-resistant, flexible rubber hoses 100' (30m) long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110 to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage rating.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures where exposed to breakage. Provide exterior fixture where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockable entrances, operable windows, and serviceable finishes. Provide heated and air-conditioned units on foundations adequate for normal loading.

H. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated re-circulation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.

I. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers, or a combination of extinguishers of NFPA-recommended classes for the exposures.

1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.

B. Provide each Facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.

1. Arrange with company and existing users for a time when service can be interrupted, if necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

3. Obtain easements to bring temporary utilities to the site where the Owner’s easements cannot be used for that purpose.

4. Use Charges: Cost or use charges for temporary facilities are not chargeable to the Owner or Designer. Neither the Owner nor Designer will accept cost or use charges as a basis of claims for Change Order.

B. Temporary Water Service: Install water service and distribution piping of sizes and pressures adequate for construction until permanent water service is in use.

1. Sterilization: Sterilize temporary water piping prior to use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload-protected disconnects, automatic ground-fault interrupters, and main distribution switch gear.

1. Install electric power service underground, except where overhead service must be used.

2. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125V, AC 20ampere rating, and lighting circuits may be nonmetallic sheathed cable where overhead and exposed for surveillance.

D. Temporary Lighting: When overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Heating: Provide temporary heat required by construction activities for curing or drying of completed installations or for protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

1. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, self-contained, LP gas or fuel-oil heaters with individual space thermostatic control.

2. Use of gasoline-burning space heaters, open flame, or salamander heating units is prohibited.

F. Temporary Telephones: Provide temporary telephone service throughout the construction period for all personnel engaged in construction activities.

1. Telephone Lines: Provide telephone lines for the following:

a. Where an office has more than two (2) occupants, install a telephone for each additional occupant or pair of occupants.

b. Provide a dedicated telephone for a fax machine in the field office.

c. Provide a separate line for the Owner’s use.

2. At each telephone, post a list of important telephone numbers.

G. Temporary Toilets: Install self-contained toilet units. Use of pit-type privies will not be permitted. Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project’s needs.

1. Shield toilets to ensure privacy.

2. Provide separate facilities for male and female personnel.

3. Provide toilet tissue materials for each facility.

H. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a health and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide paper towels or similar disposable materials for each facility.

2. Provide covered waste containers for used material.

3. Provide safety showers, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.

I. Drinking-Water Facilities: Provide containerized, tap-dispenser, bottled-water drinking-water units, including paper supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45°F to 55°F (7°C to 13°C).

J. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by runoff of storm water from heavy rains.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.

1. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Field Offices: Provide insulated, weathertight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip office as follows:

1. Furnish with a desk and chairs, a 4-drawer file cabinet, plan table, plan rack, and a 6-shelf bookcase.

2. Equip with a water cooler and private toilet complete with water closet, lavatory, and medicine cabinet unit with a mirror.

C. Storage facilities: Install storage sheds sized, furnished, and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere onsite.

D. Temporary Paving: Construct and maintain temporary roads and paving to support the indicated loading adequately and to withstand exposure to traffic during the construction period. Locate temporary paving for roads, storage areas, and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Designer.

1. Coordinate temporary paving development with subgrade grading, compaction, installation and stabilization of subbase, and installation of base and finish courses of permanent paving.

2. Install temporary paving to minimize the need to rework the installations and to result in permanent roads and paved areas without damage or deterioration when occupied by the Owner.

3. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with weather conditions to avoid unsatisfactory results.

4. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.

E. Construction Parking: Parking at the site will be provided in the areas designated at the Pre-Construction Meeting.

F. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations, and construction free of water.

G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and materials drying or curing requirements to avoid dangerous conditions and effects.

2. Install tarpaulins securely with incombustible wood framing and other materials. Close openings of 25SqFt (2.3SqM) or less with plywood or similar materials.

3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.

4. Where temporary wood or plywood enclosure exceeds 100SqFt (9.2SqM) in area, use UL-labeled, fire-retardant-treated material for framing and main sheathing.

H. Temporary Lifts and Hoists: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting materials are considered “tools and equipment” and not temporary facilities.

I. Project Identification and Temporary Signs: Prepare project identification and other signs of size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative-treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

J. Temporary Exterior Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.

K. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80°F (27°C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material lawfully.

L. Rodent Pest Control: Before deep foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests. Employ this service to perform extermination and control procedures are regular intervals so the Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

M. Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate. Cover finished, permanent stairs with a protective covering of plywood or similar material so finishes will be undamaged at the time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer, as requested by the Designer.

B. Temporary Fire Protection: Until fire-protection needs are supplied by permanent facilities, install and maintain temporary fire-protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 “Standard for Portable Fire Extinguishers” and NFPA 241 “Standard for Safeguarding Construction, Alterations, and Demolition Operations”.

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one (1) extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
4. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project complete installation of the permanent fire-protection facility including connected services and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs, and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics, and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.

E. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

1. Storage: Where materials and equipment must be stored and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of material to minimize the opportunity for theft and vandalism.

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

3.5 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Designer requests that it be maintained longer, remove each temporary facility when the need has ended, when replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are the Contractor's property. The Owner reserves the right to take possession of project identification signs.

2. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at the temporary entrances as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities used during the construction period including, but not limited to, the following:

a. Replace air filters and clean inside of ductwork and housing.

b. Replace significantly worn parts and parts subject to unusual operating conditions.

c. Replace lamps burned out or noticeably dimmed by hours of use.

END OF SECTION 015000

SECTION 017400 – CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, Bid Form and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for cleaning during the Project.

B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and anti-pollution regulations.

1. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.
2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 PROGRESS CLEANING

A. General

1. Retain all stored items in an orderly arrangement allowing maximum access, not impending drainage or traffic, and providing the required protection of materials.
2. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.
3. At least **<once><twice>** each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.
4. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the ecology.

B. Site:

1. Daily, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
2. Weekly, inspect all arrangements of materials stored on the site. Re-stack, tidy, or otherwise service all material arrangements.
3. Maintain the site in a neat and orderly condition at all times.

C. Structures:

1. Daily, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.
2. Weekly, sweep all interior spaces clean. “Clean,” for the purposes of this paragraph, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and handheld broom.
3. In preparation for installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.
4. Following the installation of finish floor materials, clean the finish floor daily while work is being performed in the space in which finish materials have been installed. “Clean,” for the purposes of this subparagraph, shall be interpreted as meaning free from all foreign material which, in the opinion of the Construction Representative, may be injurious to the finish of the finish floor material.

3.2 FINAL CLEANING

A. General: Provide final cleaning operations when indicated. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer’s instructions.

B. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.

1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.
2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
3. Remove petrochemical spills, stains, and other foreign deposits.
4. Remove tools, construction equipment, machinery, and surplus material from the site.
5. Remove snow and ice to provide safe access to the building.
6. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
7. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
8. Broom clean concrete floors in unoccupied spaces.
9. Vacuum clean carpet and similar soft surfaces removing debris and excess nap. Shampoo, if required.
10. Clean transparent material, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
11. Remove labels that are not permanent labels.
12. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    a. Do not paint over “UL” and similar labels, including mechanical and electrical nameplates.

13. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
14. Clean plumbing fixtures to a sanitary condition free of stains, including stains resulting from water exposure.
15. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
16. Clean ducts, blowers, and coils if units were operated without filters during construction
17. Clean, food-service equipment to a sanitary condition, ready and acceptable for its intended use.
18. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.
19. Leave the Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.

D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.

E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after Final Acceptance by the Owner, they become the Owner’s property.

END OF SECTION 017400

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.
3. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

B. Attendance Record: For each training module, submit list of participants and length of instruction time.

C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of videographer.
c. Name of Architect.
d. Name of Construction Manager.
e. Name of Contractor.
f. Date of video recording.

2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.

3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

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

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Coordination". Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

a. System, subsystem, and equipment descriptions.
b. Performance and design criteria if Contractor is delegated design responsibility.
c. Operating standards.
d. Regulatory requirements.
e. Equipment function.
f. Operating characteristics.
g. Limiting conditions.
h. Performance curves.

2. Documentation: Review the following items in detail:

a. Emergency manuals.
b. Operations manuals.
c. Maintenance manuals.
d. Project record documents.
e. Identification systems.
f. Warranties and bonds.
g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

    a. Diagnostic instructions.
    b. Test and inspection procedures.

7. Maintenance: Include the following:

    a. Inspection procedures.
    b. Types of cleaning agents to be used and methods of cleaning.
    c. List of cleaning agents and methods of cleaning detrimental to product.
    d. Procedures for routine cleaning
    e. Procedures for preventive maintenance.
    f. Procedures for routine maintenance.
    g. Instruction on use of special tools.

8. Repairs: Include the following:

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 007213 "General Conditions".

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video: Provide minimum 640 x 480 video resolution converted to format file type acceptable to Owner, on electronic media.

1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:

    a. Name of Contractor/Installer.
    b. Business address.
    c. Business phone number.
    d. Point of contact.
    e. E-mail address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

    a. Produce segments to present a single significant piece of equipment per segment.
    b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
    c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Form-facing material for cast-in-place concrete.
2. Shoring, bracing, and anchoring.

1.3 DEFINITIONS

A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction, movement, contraction, and isolation joints
c. Forms and form-removal limitations.
d. Anchor rod and anchorage device installation tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Exposed surface form-facing material.
2. Concealed surface form-facing material.
3. Form ties.
4. Waterstops.

5. Form-release agent.

B. Shop Drawings: Prepared by, and signed and sealed by, a qualified professional engineer responsible for their preparation, detailing fabrication, assembly, and support of forms.

1. For exposed vertical concrete walls, indicate dimensions and form tie locations.
2. Indicate dimension and locations of construction and movement joints required to construct the structure in accordance with ACI 301.

a. Location of construction joints is subject to approval of the Architect and Structural Engineer of Record.

3. Indicate location of waterstops.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspection agency.

B. Field quality-control reports.

C. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Testing and Inspection Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

2.2 FORM-FACING MATERIALS

A. As-Cast Surface Form-Facing Material:

1. Provide continuous, true, and smooth concrete surfaces.
2. Furnish in largest practicable sizes to minimize number of joints.
3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:

    a. Plywood, metal, or other approved panel materials.

        1) APA HDO (high-density overlay).
        2) APA MDO (medium-density overlay); mill-release agent treated and edge sealed.
        3) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
        4) APA Plyform Class I, B-B or better; mill oiled and edge sealed.

B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.

1. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 WATERSTOPS

A. Flexible Rubber Waterstops: U.S. Army Corps of Engineers CRD-C 513, for embedding in concrete to prevent passage of fluids through joints, with factory fabricated corners, intersections, and directional changes.
1. Profile: As indicated
2. Dimensions: As indicated

B. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals, with factory fabricate corners, intersections, and directional changes.
1. Profile: As indicated
2. Dimensions: As indicated

C. Flexible PVC Waterstops: U.S. Army Corps of Engineers CRD-C 572, for embedding in concrete to prevent passage of fluids through joints, with factory fabricate corners, intersections, and directional changes.
1. Profile: As indicated
2. Dimensions: As indicated

D. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

E. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.4 RELATED MATERIALS

A. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

C. 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.]

D. 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 to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

A. Comply with ACI 301.

B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes and Section 033300 "Architectural Concrete".

C. Limit concrete surface irregularities as follows:

1. Surface Finish-1.0: ACI 117 Class D, 1 inch.
2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch.
3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch.

D. Construct forms tight enough to prevent loss of concrete mortar.

1. Minimize joints.
2. Exposed Concrete: Symmetrically align joints in forms.

E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.

1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
2. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyways, reglets, recesses, and other accessories, for easy removal.

F. Do not use rust-stained, steel, form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips
2. Use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
2. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Architect and Structural Engineer of Record prior to forming openings not indicated on Drawings.

L. Construction and Movement Joints:

1. Construct joints true to line with faces perpendicular to surface plane of concrete.
2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
3. Place joints perpendicular to main reinforcement.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated on Drawings or at the lesser of twice the height of the wall or 25’-0”, if not indicated on the Construction Documents.

    a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

P. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
4. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
4. Secure waterstops in correct position at 12 inches on center.
5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.

    a. Miter corners, intersections, and directional changes in waterstops.
    b. Align center bulbs.

6. Clean waterstops immediately prior to placement of concrete.
7. Support and protect exposed waterstops during progress of the Work.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.

1. Install in longest lengths practicable.
2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
3. Protect exposed waterstops during progress of the Work.

3.4 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work.

1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 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. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

SECTION 03 15 23
UNDERSLAB VAPOR BARRIER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheet vapor barrier under concrete slabs on grade.

1.02 RELATED REQUIREMENTS

A. Section 03 10 00 - Concrete Forming and Accessories

B. Section 03 20 00 - Concrete Reinforcing.

C. Section 03 30 00 - Cast-in-Place Concrete

1.03 REFERENCE STANDARDS

A. ASTM E1643 - Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs; 2018a.

B. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs; 2017.

1.04 SUBMITTALS

A. See Section 013300, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products.

C. Samples: Submit samples of underslab vapor barrier to be used.

D. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Underslab Vapor Barrier:
   1. Water Vapor Permeance: Not more than 0.010 perms, maximum.
   2. Complying with ASTM E1745 Class A.
   3. Thickness: 15 mils.
   4. Basis of Design:
      a. Product: Stego Industries LLC; Stego Wrap Vapor Barrier (15-mil): www.stegoindustries.com/#sle.
      b. Substitutions: See section 006325.

B. Accessory Products: Vapor barrier manufacturer's recommended tape, adhesive, mastic, etc., for sealing seams and penetrations in vapor barrier.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install vapor barrier in accordance with manufacturer's instructions and ASTM E1643.

B. Install vapor barrier under interior slabs on grade; lap sheet over footings and seal to foundation walls.

C. Lap joints minimum 6 inches.

D. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions.

E. No penetration of vapor barrier is allowed except for reinforcing steel and permanent utilities.

F. Repair damaged vapor retarder before covering with other materials.

END OF SECTION 03 15 23

SECTION 032000 - CONCRETE REINFORCING

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. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction contraction and isolation joints.
c. Steel-reinforcement installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement. Reinforcement schedules alone are not acceptable. The reinforcement shop drawings shall also include sections and details showing reinforcement placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
3. Reproduction of Contract Drawings shall not be used for shop drawings.
4. Shop drawings shall be coordinated with other trades, construction fit up and project site conditions. The General Contractor shall coordinate this prior to submission of the Shop Drawings.

5. Design Team Review of Shop Drawings:
    a. Shop drawing review is for bar size, spacing, details and general conformation of the Contract Drawings only.
    b. Shop drawings will only be reviewed if transmitted in their entirety, unless previously approved to submit in phases. Incomplete shop drawings will be marked revise and resubmit. Time required by Wallace Design Collective, PC, to review shop drawing submittals more than one time will be billed to the General Contractor at Wallace Design Collective, PC, hourly rates.
    c. Fabrication of materials prior to review of the shop drawings is at the Contractor's risk.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect and Structural Engineer of Record.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

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

1. Steel Reinforcement:

C. Field quality-control reports.

D. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1.7 DELIVERY, STORAGE, AND HANDLING

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

1. Store reinforcement to avoid contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A615/A615M, Grade 60, deformed.

B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Plate Dowel System: Diamond Dowel System by PNA Construction Technologies or Approved Alternate.

C. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

D. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.

1. Finish: Plain.

2.3 FABRICATING REINFORCEMENT

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

PART 3 - EXECUTION

3.1 PREPARATION

A. Protection of In-Place Conditions:

1. Do not cut or puncture vapor retarder.
2. 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.

3.2 INSTALLATION OF STEEL REINFORCEMENT

A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.

B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
2. Do not tack weld crossing reinforcing bars.

C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.

D. Provide concrete coverage in accordance with ACI 318 or as specified on the Drawings.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

F. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 36 bar diameters at splices, 24 inches, or as specified on Drawings, whichever is greater.
2. Stagger splices in accordance with ACI 318.

G. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

    a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.

2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
4. Lace overlaps with wire.

3.3 JOINTS

A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect or Structural Engineer of Record.

1. Place joints perpendicular to main reinforcement.
2. Continue reinforcement across construction joints unless otherwise indicated.
3. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117.

3.5 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. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel-reinforcement placement.

D. Manufacturer's Inspections: Engage manufacturer of structural thermal break insulated connection system to inspect completed installations prior to placement of concrete, and to provide written report that installation complies with manufacturer's written instructions.

END OF SECTION 032000

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:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.

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. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.
c. Vapor-retarder installation.
d. Anchor rod and anchorage device installation tolerances.
e. Cold and hot weather concreting procedures.
f. Concrete finishes and finishing.
g. Curing procedures.
h. Forms and form-removal limitations.
i. Methods for achieving specified floor and slab flatness and levelness.
j. Floor and slab flatness and levelness measurements.
k. Concrete repair procedures.
l. Concrete protection.
m. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
n. Protection of field cured field test cylinders.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

   a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
5. Vapor retarders.
6. Floor and slab treatments.
7. Liquid floor treatments.
8. Curing materials.
9. Joint fillers.
10. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification and intended location of placement.
2. Minimum 28-day compressive strength.
3. Proportions of ingredients used for the composition of design mixtures.
4. Durability exposure class.
5. Maximum w/cm.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Dosage of Admixture
10. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
11. Documentation of average strength

12. Intended placement method.
13. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
   a. Location of construction joints is subject to approval of the Architect and Structural Engineer of Record.

2. Edge of slab plans.
   a. Location of slab edges is subject to approval of the architect.
   b. Prior to submitting the slab edge plan, the general contractor shall coordinate the slab edges with the approved storefront, curtainwall, and door submittals.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.
3. Testing agency: Include copies of applicable ACI certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Floor and slab treatments.
5. Vapor retarders.
6. Semirigid joint filler.
7. Joint-filler strips.
8. Repair materials.

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

1. Portland cement.
2. Fly ash.

3. Aggregates.
4. Admixtures

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Research Reports:

1. For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.
2. For sheet vapor retarder/termite barrier, showing compliance with ICC AC380.

F. Preconstruction Test Reports: For each mix design.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

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

1. Post-Installed Concrete Anchors Installers: ACI-certified Adhesive Anchor Installer.

B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Field Quality Control Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated.

1. Personnel conducting field tests shall be qualified as an ACI Concrete Field Testing Technician, Grade 1, in accordance with ACI CPP 610.1 or an equivalent certification program.

1.8 PRECONSTRUCTION TESTING

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

1. Include the following information in each test report:

a. Admixture dosage rates.
b. Slump.
c. Air content.
d. Seven-day compressive strength.
e. 28-day compressive strength.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301.

B. Concrete supplier shall have sufficient capacity and adequate facilities to provide continuous delivery at the rate required for continuous placement throughout any sequence of placement.

C. Storage of Concrete Materials:

1. Store cement in weather tight buildings or bins which prevent intrusion of moisture or contaminants. Store different types of cement in separate facilities.
2. Stockpile aggregates to prevent segregation and contamination with other materials. Thaw frozen aggregates before use.
3. Sand shall be drained to a uniform moisture content before use.
4. Store admixtures securely to prevent contamination, evaporation damage or temperature variation in excesses of the range recommended by the manufacturer.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F, other than reinforcing steel.
5. 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 and ACI 305.1, and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F.
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 ACI 301 unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I, grey.
2. Fly Ash: ASTM C618, Class C or F. Use only one type and source throughout the project

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.

2. Maximum Coarse-Aggregate Size: As Specified in the contract drawings.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

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

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.

2. Retarding Admixture: ASTM C494/C494M, Type B.
3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, except with maximum water-vapor permeance of 0.1; not less than 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.4 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. when dry.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F: Black.
b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
c. Ambient Temperature Above 85 deg F: White.

D. Curing Paper: Eight-feet-wide paper, consisting of two layers of fibered kraft paper laminated with double coating of asphalt.

E. Water: Potable or complying with ASTM C1602/C1602M.

F. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

2.6 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested in accordance with ASTM C109/C109M.

2.7 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, in accordance with ACI 301.

1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
2. Required Average Strength for each type of concrete:

a. Where suitable test records for the concrete production facility are available, design strength may be tested on the standard deviation in accordance with ACI 318.
b. Where strength test records are not available, design strength and documentation of average strength as noted in ACI 318, Chapter 5.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows, unless noted otherwise in specific concrete mix design specification:

1. Fly Ash or Other Pozzolans: 25 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing or 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/cm below 0.50.
4. Slump limits noted are prior to adding water-reducing admixtures. Slump limits shall be no more than 8 inches after adding water-reducing admixtures.

2.8 CONCRETE MIXTURES

A. Mixtures shall be per the contract documents

B. Air Content:

a. Exposure Class F1: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1 1/2-inch nominal maximum aggregate size.
b. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.

1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
3. conditions.

3.4 INSTALLATION OF VAPOR RETARDER

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.

1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
2. Face laps away from exposed direction of concrete pour.
3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
4. Lap joints 6 inches and seal with manufacturer's recommended tape.
5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
7. Protect vapor retarder during placement of reinforcement and concrete.

    a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.5 JOINTS

A. Construct joints true to line, with faces perpendicular to surface plane of concrete.

B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.

1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect or Structural Engineer of Record.
2. Place joints perpendicular to main reinforcement.
    a. Continue reinforcement across construction joints unless otherwise indicated.
    b. Do not continue reinforcement through sides of strip placements of floors and slabs.
3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints per the contract drawings.
1. Sawed Joints:
    a. Primary Method: Soft-Cut System method, by Soff-Cut International, Corona, CA (800) 776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 2 hours after final finish at each saw cut location.
    b. Optional Method (Where Soft-Cut System Method Equipment is Not Available): Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks. Properly time cutting with the set of the concrete. Saw-Cut control joints within 12 hours after finishing. Complete cutting before shrinkage stresses become sufficient to produce cracking.
2. Spacing: Provide joints at locations as noted on Contract Drawings.

D. Isolation Joints in Slabs-on-Ground: 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 on Drawings.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch 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.

E. Doweled Joints:

1. Install dowel bars and support assemblies at joints where indicated on Drawings.
2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.

F. Dowel Plates: Install dowel plates at joints where indicated on Drawings or as alternate to to dowel bars indicated in the slab-on-grade. Contractor shall verify with Structural Engineer of Record that substitution locations are acceptable prior to installation of dowel plates.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.

1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect or Structural Engineer of Record in writing, but not to exceed the amount indicated on the concrete delivery ticket.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.

1. If a section cannot be placed continuously, provide construction joints as indicated.
2. Deposit concrete to avoid segregation.
3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.

    a. Do not use vibrators to transport concrete inside forms.
    b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
    c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
    d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Do not place concrete floors and slabs in a checkerboard sequence.
2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
3. Maintain reinforcement in position on chairs during concrete placement.

4. Screed slab surfaces with a straightedge and strike off to correct elevations.
5. Level concrete, cut high areas, and fill low areas.
6. Slope surfaces uniformly to drains where required. Confirm with Architect and Structural Engineer of Record before proceeding with a specific slope or on exterior concrete without a specific slope.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.

   a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
   b. Remove projections larger than 1 inch.
   c. Tie holes do not require patching.
   d. Surface Tolerance: ACI 117 Class D.
   e. Apply to concrete surfaces not exposed to public view.

2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.

   a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
   b. Remove projections larger than 1/4 inch.
   c. Patch tie holes.
   d. Surface Tolerance: ACI 117 Class B.
   e. Locations: Apply to concrete surfaces exposed to public view,.

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Refer to the contract documents for finish at specific locations.

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view.

3.9 FINISH FLOOR TOLERANCES

A. Finish floor tolerances shall meet the following:

1. Trowel finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:

a. Slabs on Ground:
1) Per the contract drawings

3.10 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

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

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 3000 psi at 28 days.

4. 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 concrete base. Drill and epoxy into concrete base with approved concrete epoxy material.
5. For supported equipment, install approved anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices.

    a. Verify with Structural Engineer of Record the location, size and thickness of equipment base/
    b. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    c. Cast anchor-bolt insert into bases.
    d. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE CURING

A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.

B. Cold-Weather Placement: Comply with ACI 306.1, ACI 306R 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 the average of the highest and lowest ambient temperature from midnight to midnight is expected to be less than 40 degrees F for more than three successive days, deliver concrete to meet the following minimum temperatures immediately after placement:
    a. 55 degrees F for sections less than 12 inches in the least dimension;
    b. 50 degrees F for sections 12 to 36 inches in the least dimension;
    c. 45 degrees F for sections 36 to 72 inches in the least dimension; and
    d. 40 degrees F for sections greater than 72 inches in the least dimension.
2. The temperature of concrete as placed shall not exceed these values by more than 20 degrees F. If exceeded, concrete shall not be placed and engineer of record shall be notified.
3. The minimum requirements may be terminated when temperatures above 50 degrees F occur during more than half of any 24 hour duration.
4. When the outdoor temperature is less than 40 degrees F, maintain temperature of placed concrete at not less than 50 degrees F for required curing time.
5. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
6. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

C. Hot-Weather Placement: Comply with ACI 301, ACI 305.1, ACI 305R, and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. If exceeded, concrete shall not be placed and engineer of record shall be notified. 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.
3. Precautions to protect fresh concrete from developing plastic shrinkage cracks must be taken in advance of concrete placement when evaporation rate due to any combination of temperature, humidity, and wind velocity is expected to approach 0.2 lb./sq. ft./hr. as determined by ACI 305R. Acceptable precautions to reduce the rate of evaporation include use of wind breaks, fog spray, covering with polyethylene sheeting, or wet cover.

D. Windy Weather Placement: Comply with ACI 301, ACI 305.1, ACI 305R and as follows:

E. Precautions to protect fresh concrete from developing plastic shrinkage cracks must be taken in advance of concrete placement when evaporation rate due to any combination of temperature, humidity, and wind velocity is expected to approach 0.2 lb./sq. ft./hr. as determined by ACI 305R. Acceptable precautions to reduce the rate of evaporation include use of wind breaks, fog spray, covering with polyethylene sheeting, or wet cover.

F. Curing Formed Surfaces: Comply with ACI 308.1 as follows:

1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. If removing forms before end of curing period, continue curing for remainder of curing period with one of the following:

    a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
    b. Continuous Sprinkling: Maintain concrete surface continuously wet.
    c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
    d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
    e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.

        1) Recoat areas subject to heavy rainfall within three hours after initial application.
        2) Maintain continuity of coating and repair damage during curing period.

G. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:

1. Begin curing immediately after finishing concrete.
2. Interior Concrete Floors:

a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12-inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.

a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
b) Cure for not less than seven days.

3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

c. Floors to Receive Polished Finish: Contractor has option of the following:

1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.

a) Lap edges and ends of absorptive cover not less than 12 inches.
b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

a) Water.
b) Continuous water-fog spray.

d. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.
2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.12 TOLERANCES

A. Conform to ACI 117.

3.13 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller in accordance with manufacturer's written instructions.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect or Structural Engineer of Record.
2. Remove and replace concrete that cannot be repaired and patched to Architect's or Structural Engineer of Record’s approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

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 in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch.
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.
d. Fill and compact with patching mortar before bonding agent has dried.
e. 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.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

   a. Correct low and high areas.
   b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

   a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

   a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
   b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

   a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.
   b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete.

   a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch clearance all around.
   b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
   c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
   d. Place, compact, and finish to blend with adjacent finished concrete.
   e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.
c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect or Structural Engineer of Record's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.

B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.

a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:

1) Project name.
2) Name of testing agency.
3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
4) Name of concrete manufacturer.
5) Date and time of inspection, sampling, and field testing.
6) Date and time of concrete placement.
7) Location in Work of concrete represented by samples.
8) Date and time sample was obtained.
9) Truck and batch ticket numbers.
10) Design compressive strength at 28 days.
11) Concrete mixture designation, proportions, and materials.
12) Field test results.
13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.

14) Type of fracture and compressive break strengths at seven days and 28 days.

C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

D. Inspections:
1. Anchor Rods
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. All other special inspection items as noted on the Contract Drawings.

E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof. For slabs, obtain at least one composite sample for the minimum of each 150 cubic yard or each 5,000 square feet of slab placed each day.

a. One Composite sample shall consist of a minimum of four cylinders.
b. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C143/C143M:

a. 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.
b. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete;.

a. 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 C1064/C1064M:

a. 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 C31/C31M:

a. Cast and laboratory cure two sets of four 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.

b. Cast, initial cure, and field cure two sets of four standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C39/C39M.

a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
c. 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. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
9. 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.
10. Additional Tests:

a. 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.
b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.

1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.

11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
13. Inspection Reports shall include items inspected, inspection locations and verification of compliance or deviations from the Contract Documents.
14. Concrete strength tests made and tested by testing laboratory shall be the sole criteria of concrete strength unless in-situ tests are made in accordance with the Building Code by a qualified independent testing laboratory. Concrete for which strength tests do not meet criteria for acceptance shall be considered inadequate until proven otherwise.
15. Where concrete strength tests fail to meet the criteria specified herein, the Structural Engineer of Record shall be the sole judge of structural adequacy of concrete.
a. The burden of proof of structural adequacy shall be the responsibility of the Contractor.

b. If upon the evaluation of structural adequacy the testing is inadequate strength, in opinion of the Structural Engineer of Record, portions of the structure shall be repaired or removed and replaced as directed by the Structural Engineer of Record at no additional expense to the owner.

16. If strength tests fall below the specified strength, Contractor shall either improve curing conditions or shall modify the design mixtures to improve strength.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.17 PROTECTION

A. Protect concrete surfaces as follows:

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.
7. 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.
8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

SECTION 03 30 05
MOISTURE VAPOR REDUCING ADMIXTURE FOR CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Moisture vapor reducing admixture (MVRA) for cast-in-place concrete.

1.02 REFERENCE STANDARDS

A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete; 1991 (Reapproved 2009).

B. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.

C. ASTM D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter; 2016a.

D. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a.

1.03 SUBMITTALS

A. See Section 013300 Submittals, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Field Quality Control Submittals: Include project name and number, date of MVRA application, name of testing agency, location of concrete batch in work, mix proportions, materials, and test result.

D. Manufacturer's Qualification Statement.

E. Concrete Supplier's Qualification Statement.

F. Concrete Finisher's Qualification Statement.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 WARRANTY

A. See Section 013300 Submittals, for additional warranty requirements.

B. Slabs with Moisture Vapor Reducing Admixture (MVRA): Provide warranty to cover the cost of flooring failures due to moisture migration from slabs for ten years.

1. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.

PART 2 PRODUCTS

2.01 MOISTURE VAPOR REDUCING ADMIXTURE

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

B. Moisture Vapor Reducing Admixture (WVRA): ASTM C494/C494M, Type S; liquid, inorganic admixture free of volatile organic compounds (VOCs); formulated to react with cementitious material to integrally and permanently close capillary systems formed during curing.

1. Location: Provide admixture in slabs to receive adhesively applied flooring.
2. Capillary Break: Calcium silicate hydrate.
3. Water Vapor Permeance: 0.03 perms, maximum, when tested in accordance with ASTM E96/E96M.
4. Hydraulic Conductivity: 3.28 x 10^-8 feet per second, maximum, when tested according to ASTM D5084.
5. Toxicity: None.
6. Solvent: Water.

7. Hazardous Vapors: None.

2.02 MANUFACTURERS

A. Basis of Design: Specialty Products Group; Vapor Lock 20/20: www.spggogreen.com/#sle.

B. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
   1. ISE Logik Industries; MVRA 900; www.iselogik.com.
   2. Concure Systems; Concure Systems Admixture; www.concuresystems.com.
   3. Barrier One; CPS Admixture; www.barrierone.com
   4. Bone Dry Products; Bone Dry Pro Admix (MVRA); info@@bonedryproducts.com.
   5. AVECS, Pro-Act MVRA; www.avecs.build

C. Substitutions: See section 006325 .

2.03 ACCESSORY MATERIALS

A. Underslab Vapor Retarder: See Section 031523.

2.04 CONCRETE MIX DESIGN

A. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates required by manufacturer.

PART 3 EXECUTION

3.01 INSTALLATION

A. Dispense MVRA according to mix design and supplier's written instructions.

B. Add MVRA to concrete according to manufacturer's written instructions.

C. Place and cure concrete as specified in Section 03 30 00.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, contracted by the General Contractor, will perform field quality control tests.

B. Provide free access to concrete operations at project site and cooperate with appointed testing agency.

C. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.

D. Maintain four concrete cylinders for one year from date of Substantial Completion.

E. Test cylinders as required by WRVA manufacturer.

F. Demonstrate test cylinders comply with requirements specified in Part 2.

G. Test one cylinder per project.

H. Field Quality Control Reports:
   1. Submit test results to Architect, Construction Manager, and WVRA manufacturer, within 48 hours of testing.
   2. Include project name, project number, date of MVRA application, name of testing agency, location of concrete in the Work, concrete mix design, and waterproofing capability.

I. Defective Concrete: Concrete not complying with specified requirements.

J. When test results indicate concrete does not comply with specified requirements, conducts additional tests as directed by Architect. The cost of additional testing shall be borne by the Contractor when defective concrete is identified.

K. Repair or replacement of defective concrete will be determined by the Architect.

END OF SECTION 03 30 05

SECTION 03 52 16
LIGHTWEIGHT INSULATING CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating concrete fill over structural roof decking.

1.02 REFERENCE STANDARDS

A. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.

B. ASTM C138/C138M - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete; 2024a.

C. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.

D. ASTM C332 - Standard Specification for Lightweight Aggregates for Insulating Concrete; 2023.

E. ASTM C495/C495M - Standard Test Method for Compressive Strength of Lightweight Insulating Concrete; 2012 (Reapproved 2019).

F. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete; 2018.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.04 SUBMITTALS

A. Shop Drawings: Indicate layout of slopes, drain locations, and interruptions.

B. Product Data: Provide physical characteristics, thermal values, product limitations.

C. Certificates: Certify that products of this section meet or exceed specified requirements and that densities and indicated thicknesses have been achieved.

D. Manufacturer's Installation Instructions: Indicate mix instructions.

E. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Approved by manufacturer lightweight insulating concrete manufacturer.

1.06 FIELD CONDITIONS

A. Do not place insulating concrete mix at ambient temperatures lower than 40 degrees F without heating mix water to 90 to 110 degrees F.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Lightweight Insulating Concrete:
   1. Elastizell Corp. of America: www.elastizell.com/#sle.
   2. Substitutions: 006325 Product Substitution Request.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for combustibility requirements.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of lightweight insulating concrete materials in the required fire rated assembly.

2.03 MATERIALS

A. Cement: ASTM C150/C150M, Portland Type I - Normal, gray color.

B. Lightweight Aggregate: ASTM C332; Group I, perlite.

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 CONCRETE MIX

A. Test for compressive strength in accordance with ASTM C495/C495M, for wet density in accordance with ASTM C138/C138M, and for dry density after oven drying.

B. Provide concrete mix with the following minimum properties:
   1. Slump: ____ inch.

C. Average Overall Thermal Resistance of Installed Fill: R of ____.

2.05 ACCESSORIES

A. Reinforcement:
   1. ASTM A1064/A1064M steel welded wire reinforcement, galvanized, sizes as indicated on drawings.

B. Insulation: ASTM C578, Type I molded polystyrene with venting holes to 3 percent of board area.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof deck is free of standing water, dirt, debris, ice, or other detrimental materials.

B. Verify roof slopes and elevations are as shown on the drawings and ready to receive insulating concrete.

C. Do not proceed with work until detrimental conditions have been corrected.

3.02 INSTALLATION

A. Slurry deck surface; place insulation; use mix to fill holes and breaks.

B. Place insulating concrete and screed surface to achieve minimum 2 inch thickness.

C. Slope top surface to 1/4 inch/foot for roof surface drainage.

3.03 CURING

A. Cure in accordance with lightweight aggregate manufacturer's instructions.

B. Protect insulating concrete from excess evaporation of surface moisture.

C. During low humidity conditions, sprinkle water over concrete surface to aid hydration and curing.

3.04 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 01 40 00 - Quality Requirements, will perform field inspection and testing for dry density.
   1. Testing Agency: Take three test samples from each 100 cubic yards of insulating concrete placed.
   2. Testing Agency: Take one additional test sample during cold weather concreting.

END OF SECTION 03 52 16

SECTION 042200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

1.2 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

C. Samples: For each type and color of the following:

1. Exposed CMUs.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each type and size of product. For masonry units, include data on material properties and material test reports substantiating compliance with requirements.

B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test in accordance with ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, in accordance with ASTM C1019, for grout mixes required to comply with compressive strength requirement.

1.5 FIELD CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost

or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. CMUs: ASTM C90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi.
2. Density Classification: Normal weight unless otherwise indicated.

C. Concrete Building Brick: ASTM C55.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2800 psi.
2. Density Classification: Normal weight U.N.O.

2.3 CONCRETE LINTELS

A. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C91/C91M.

E. Aggregate for Mortar: ASTM C144.

1. White-Mortar Aggregates: Natural white sand or crushed white stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

H. Water: Potable.

2.5 REINFORCEMENT

A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.
2. Wire Size for Side Rods: 0.148-inch diameter.
3. Wire Size for Cross Rods: 0.148-inch diameter.
4. Spacing of Cross Rods: Not more than 16 inches o.c.
5. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

2.6 TIES AND ANCHORS

A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.

2. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized-steel wire.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch diameter, hot-dip galvanized-steel wire.

2.7 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:

1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees.
5. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into 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 1/4 inch to form a stop for retaining sealant backer rod.
6. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch.

3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch.

4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 0.040 inch thick.

C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane, or PVC.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.9 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime or masonry cement mortar.
4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry below grade or in contact with earth, use Type S.
2. For reinforced masonry, use Type N.
3. For mortar parge coats, use Type N.

4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
3. Provide grout with a slump of 10 to 11 inches as measured in accordance with ASTM C143/C143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet , or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.3 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.

3.7 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At lintels, extend flashing a 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.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.8 REINFORCED UNIT MASONRY

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 64 inches.

3.9 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements is done at Contractor's expense.

B. Inspections: Special inspections in accordance with Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, in accordance with ASTM C140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, in accordance with ASTM C780.

G. Mortar Test (Property Specification): For each mix provided, in accordance with ASTM C780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, in accordance with ASTM C1019.

I. Prism Test: For each type of construction provided, in accordance with ASTM C1314 at seven days and at 28 days.

3.10 REPAIRING, POINTING, AND CLEANING

A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.11 MASONRY WASTE DISPOSAL

A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

SECTION 04 72 00
CAST STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Architectural cast stone.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants:

1.03 REFERENCE STANDARDS

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

B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement; 2020.

D. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement; 2019.

E. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement; 2025.

F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2024.

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

H. ASTM C150/C150M - Standard Specification for Portland Cement; 2021.

I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

J. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete; 2019.

K. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 2021.

L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2016.

M. ASTM C1364 - Standard Specification for Architectural Cast Stone; 2023.

1.04 SUBMITTALS

A. Product Data: Test results of cast stone components made previously by the manufacturer.

B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

C. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.

D. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications:
   1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
   2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.

3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Caliber Cast Stone (O'Fallon, MO)
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
      a. Advanced Cast Stone
      b. Continental Cast Stone, Inc.
      c. Heritage Cast Stone, Inc.
      d. Midwest Cast Stone.
   2. Substitutions: 006325 Product Subsititution Request.

2.02 ARCHITECTURAL CAST STONE

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural stone, complying with ASTM C1364.
   1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
   3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
   4. Color: Selected by Architect from manufacturer's full range.

B. Shapes: Provide shapes indicated on drawings.
   1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
   2. Unless otherwise indicated on drawings, provide:
      a. Wash or slope of 1:12 on exterior horizontal surfaces.
      b. Drips on projecting components, wherever possible.
      c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI CODE-318.
   1. Pieces More than 24 inches in Any Dimension: Provide full length two-way reinforcement of cross-sectional area not less than 0.25 percent of unit cross-sectional area.

2.03 MATERIALS

A. Portland Cement: ASTM C150/C150M.
   1. For Mortar: Type I or II, except Type III may be used in cold weather.

B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.

D. Pigments: ASTM C979, inorganic iron oxides; do not use carbon black.

E. Admixtures: ASTM C494/C494M.

F. Water: Potable.

G. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.
   1. Galvanized in accordance with ASTM A767/A767M, Class I.

H. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.

I. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.

J. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A123M, of shapes and sizes as required for conditions.

K. Mortar: Portland cement-lime, ASTM C270 Type N ; do not use masonry cement.

L. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

2.04 SOURCE QUALITY CONTROL

A. Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C642.
   2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

A. Mechanically anchor cast stone units indicated; set remainder in mortar.

B. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing.
   2. Remove excess mortar from face of stone before pointing joints.
   3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
   4. Leave the following joints open for sealant:
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.

b. Joints in projecting units.
c. Joints between rigidly anchored units, including soffits, panels, and column covers.
d. Joints below lugged sills and stair treads.
e. Joints below ledge and relieving angles.
f. Joints labeled "expansion joint".

B. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.

B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.

C. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
1. Wet surfaces with water before applying cleaner.
2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
3. Remove cleaner promptly by rinsing thoroughly with clear water.
4. Do not use acidic cleaners.

3.06 PROTECTION

A. Protect completed work from damage.

B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION 04 72 00

SECTION 04 73 00
MANUFACTURED STONE MASONRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Adhered manufactured stone masonry veneer (AMSMV).

B. Installation materials.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing: Steel stud backup for AMSMV.

B. Section 06 10 00 - Rough Carpentry: Wood stud backup for AMSMV; plywood and OSB sheathing.

C. Section 07 92 00 - Joint Sealants

1.03 REFERENCE STANDARDS

A. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2023.

B. ANSI A118.15 - American National Standard Specifications for Improved Modified Dry-Set Cement Mortar; 2023.

C. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019a, with Editorial Revision.

D. ASTM C847 - Standard Specification for Metal Lath; 2018 (Reapproved 2024).

E. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster; 2024.

F. ASTM C1670/C1670M - Standard Specification for Adhered Manufactured Stone Masonry Veneer Units; 2021b.

G. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry; 2019a.

H. ASTM C1780 - Standard Practice for Installation Methods for Cement-Cased Adhered Masonry Veneer; 2020.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

J. ICC-ES AC51 - Acceptance Criteria for Precast Stone Veneer; 2016.

K. NCMA (AMSV) - Installation Guide and Detailing Options for Compliance with ASTM C1780 for Adhered Manufactured Stone Veneer; Current Edition, Including All Revisions.

L. NCMA TEK 20-01 - Key Installation Checkpoints for Manufactured Stone Veneer; 2014.

M. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2022, with Errata.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Provide data for AMSMV units, mortar, lath, rainscreen drainage material, and water-resistive barrier, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Color charts.
   4. Installation methods.

C. Shop Drawings: Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on drawings.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Evaluation Service Reports: Show compliance of AMSMV with specified requirements of ICC-ES AC51.

F. Manufacturer's Certificate: Certify that AMSMV units and mortar meet or exceed specified requirements.

G. Manufacturer's Qualification Statement.

H. Installer's Qualification Statement.

I. Specimen Warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum ten years of documented experience.
   1. Current producer member of the National Concrete Masonry Association.

B. Installer Qualifications: Company specializing in performing work of type specified, with at least five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Prevent mechanical damage and contamination by other materials.

C. Protect products from precipitation combined with freezing temperatures. Do not install products with visible frozen moisture.

D. Protect Portland cement based materials from moisture and humidity. Store under cover off the ground in a dry location.

1.07 FIELD CONDITIONS

A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.

B. Provide 50 year manufacturer warranty for AMSMV.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Adhered Manufactured Stone Masonry Veneer (AMSMV):
   1. Echelon Masonry
   2. Coronado Stone Products; ____: www.coronado.com/#sle.
   3. Eldorado Stone: www.eldoradostone.com/#sle.
   4. Substitutions: See Section 01 60 00 - Product Requirements.

2.02 ADHERED MANUFACTURED STONE MASONRY VENEER (AMSMV)

A. AMSMV: Cast masonry units using a mixture of cement, lightweight aggregates, concrete additives and color pigments to replicate appearance of natural stone and designed to be applied with a cementitious mortar to a backing surface, complying with ASTM C1670/C1670M and ICC-ES AC51.
   1. Style: As indicated on drawings.
   2. Color, Texture, Range, and Special Shapes: As indicated on drawings.

B. AMSMV Trim: Provide wall caps, drip ledges, and corner stones as required.

2.03 MORTAR APPLICATIONS

A. At Contractor's option, mortar may be field-mixed from packaged dry materials, made from factory premixed dry materials with addition of water only, or ready-mixed.

B. Mortar Color: Natural gray unless otherwise indicated.

C. Scratch Coat Mortars: Scratch coat mortars for application directly to metal lath.
   1. Site-Mixed: ASTM C270, Type N or Type S, using the Proportion Method.
   2. Prepackaged/Preblended: ASTM C1714/C1714M, Type N or Type S.

D. Pointing Mortars: Pointing or grouting mortars used to fill the joints between individual AMSMV units once the setting bed mortar has sufficiently cured.
   1. Site-Mixed: ASTM C270, Type N or Type S, using the Proportion Method.
   2. Prepackaged/Preblended: ASTM C1714/C1714M, Type N or Type S.
   3. Prepackaged/Preblended Latex Modified: ANSI A118.4 or ANSI A118.15.

2.04 ACCESSORIES

A. Metal Lath with Rainscreen Drainage Material: Factory-assembled combination of mesh drainage material and metal lath.
   1. Diamond Mesh Metal Lath: ASTM C847, galvanized, self-furring.
      a. Weight: 3.4 lb/sq yd, minimum.
   2. Rainscreen Drainage Mesh: 90 percent open non-woven polyester mesh.
      a. Thickness: 1/4 inch.
      b. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less (Class A), when tested in accordance with ASTM E84.
   3. Manufacturers:
      a. Mortar Net Solutions; LathNet: www.mortarnet.com/#sle.
      b. Substitutions: 006325 Product Substitution Request.

B. Cleaning Solution: Non-acidic, not harmful to AMSMV work or adjacent materials, approved by AMSMV manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrates to receive mortar scratch coat or setting bed comply with AMSMV manufacturer's instructions, NCMA (AMSV), NCMA TEK 20-01, ASTM C1780 and ICC-ES AC51:
   1. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.

B. Verify that related items provided under other sections are properly sized and located.

3.02 INSTALLATION - RAINSCREEN DRAINAGE MATERIAL

A. Install rainscreen drainage material and metal lath with accessories over sheathing material and water-resistive barrier with fastening system in accordance with ASTM C1063 into wood or metal studs. Install drainage material with filter fabric mortar screen to exterior.

B. Install metal lath with rainscreen drainage material in accordance with the manufacturer's instructions.

3.03 INSTALLATION - AMSMV

A. Install AMSMV with a cementitious mortar setting bed to a scratch coat backing surface, in accordance with AMSMV manufacturer's instructions, NCMA (AMSV), NCMA TEK 20-01, ASTM C1780 and ICC-ES AC51.

B. Seal all joints at wall openings and penetrations with sealant approved for use with AMSMV.

3.04 CLEANING

A. Remove excess mortar and mortar smears as work progresses.

B. Clean AMSMV in accordance with manufacturer's installation instructions.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

3.05 PROTECTION

A. Protect finished work from rain during and for 48 hours following installation.

B. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 04 73 00

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. Miscellaneous angles and plates.
   3. Bolts and anchor rods.
   4. Steel assemblies to be embedded in concrete.
   5. Supplementary parts and members necessary to complete and erect structural steel frame.
   6. Shop painting.
   7. Grout.

B. Related Requirements:
   1. Section 055000 "Metal Fabrications" for 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 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 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.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
   1. Power source (constant current or constant voltage).
   2. Electrode manufacturer and trade name, for demand critical welds.

D. Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:
   1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
   2. Direct-tension indicators.
   3. Tension-control, high-strength, bolt-nut-washer assemblies.
   4. Shear stud connectors.
   5. Shop primers.
   6. Non-shrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD, or is accredited by the IAS Fabricator Inspection Program for Structural Steel (AC 172).

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. 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."

1.9 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 during delivery, off-loading and erection.
   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 re--lubricate 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 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.
   1. Select and complete connections using schematic details indicated and AISC 360.
   2. Use Allowable Stress Design; data are given at service-load level, unless noted otherwise

B. Construction: Combined system of moment frame and braced frame

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes, WT-Shapes, and Channels: ASTM A 992.

B. Angles, M-Shapes and S-Shapes: ASTM A572, Grade 50.

C. Plates, Rods, Bar, and connecting materials: ASTM A572, Grade 50.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade C structural tubing.

E. Pipe: ASTM A53, Grade B

F. Welding Electrodes: Comply with AWS Requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type 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. Un-headed Anchor Rods: ASTM F 1554, Grade 36, weldable.
   1. Configuration: Straight.
   2. Nuts: ASTM A 563 heavy-hex carbon steel.
   3. Plate Washers: ASTM A 36 carbon steel.
   4. Washers: ASTM F 436, Type 1, hardened carbon steel.
   5. Finish: Plain, except where indicated to be galvanized.

D. Threaded Rods: ASTM A 36.
   1. Nuts: ASTM A 563 heavy-hex carbon steel.
   2. Washers: ASTM F 436, Type 1, hardened carbon steel.
   3. Finish: Plain, except where indicated to be galvanized.

2.4 PRIMER

A. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.5 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 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. Camber structural-steel members where indicated.
   2. Fabricate beams with rolling camber up.
   3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
   4. Mark and match-mark materials for field assembly.
   5. 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 3, "Power Tool Cleaning."

F. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with 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.
   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.

2.7 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 and AWS D1.8/D1.8M 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.

2.8 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.
   2. Surfaces to be field welded.
   3. Surfaces of high-strength bolted, slip-critical connections.
   4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   5. Galvanized surfaces.
   6. Surfaces enclosed in interior construction.
   7. Top flanges of beams with shear connectors to support metal deck.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to 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. 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.

D. Painting: Prepare steel and apply a one-coat, non-asphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.9 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, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
   2. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
   3. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.
   4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M for stud welding and as follows:
      a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear stud connector.
      b. Conduct tests in accordance with requirements in AWS D1.1/D1.1M on additional shear stud connectors if weld fracture occurs on shear stud connectors already tested.

B. Prepare test and inspection reports.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
   1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

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, Bearing Plates and Leveling Plates: Clean concrete-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.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. 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.

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 and AWS D1.8/D1.8M 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. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
   3. 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.

C. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
      c. Ultrasonic Inspection: ASTM E 164.
      d. Radiographic Inspection: ASTM E 94.
      e. In addition to visual inspections, ultrasonic testing (UT) of welds shall be performed as specified on the Contract Documents.
         1) The ultrasonic testing (UT) rejection rate shall be determined as the number of welds containing defects divided by the number of welds completed. Welds that contain acceptable discontinuities shall not be considered as having defects when the rejection rate is determined. For evaluating the rejection rate of continuous welds over 3 feet in length where the effective throat is 1 inch or less, each 12 inch increment of fraction thereof shall be considered as one weld. For evaluating the reject rate on continuous welds over 3 feet in length where the effective throat is greater than 1 inch, each 6 inches of length or fraction thereof shall be considered one weld
         2) The percentage of required testing may be reduced or shall be increased according to the following:
            a) For projects that contain 40 or fewer welds, there shall be no reduction in the ultrasonic testing rate. The rate of UT is permitted to be reduced if approved by the Engineer of Record and the Authority Having Jurisdiction. Where the initial rate of UT is 100%, the nondestructive testing (NDT) rate for an individual welder or welding operator is permitted to be reduced to 25%, provided the reject rate, the number of welds containing unacceptable defects divided by the number of welds completed, is demonstrated to be 5% or less of the welds tested for the welder or welding operator. A sampling of at least 40 completed welds shall be made for such reduced evaluation on each project.
            b) For structures in Risk Category II and higher, where the initial rate for UT is 10%, the NDT rate for an individual welder or welding operator shall be increased to 100% should the rejection rate, the number of welds containing unacceptable defects divided by the number of welds completed, exceeds 5% of the welds tested for the welder or welding operator. A sampling of at least 20 completed welds on each project shall be made prior to implementing such an increase. In the rejection rate for the welder or welding operator falls to 5% or less on the basis of at least 40 completed welds, the rate of UT may be to 10%. For evaluation the reject rate of continuous welds over 3 feet in length where the effective throat is 1 inch or less each 12 inch increment or fraction thereof shall be considered as one weld. For evaluating the

reject rate on continuous welds over 3 feet in length where the effective throat is greater than 1 inch, each 6 inches of length or fraction thereof shall be considered one weld.

2. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1 for stud welding and as follows:
   a. Initial testing of shear studs at start of work period: Test weld on at least 2 shear studs at start of each work period to determine proper generator control unit, and stud welder settings. Bend studs 45 degrees from vertical by striking with hammer. Inspect weld. Do not include these studs in required total number of studs required on beam. Contractor shall add replacement studs to supplement studs tested by bending 45 degrees.
   b. Visually inspect welds at shear studs: Visually inspect all studs. Test studs that do not appear to have full sound 360 degrees fillet weld at base. Test by bending 15 degrees from vertical toward nearest end of beam by striking with hammer. Contractor shall replace studs that fail this test.
   c. Periodic field testing of shear studs: Test one stud on each beam or girder after weld cools. Test by bending 15 degrees from vertical toward nearest end of beam by striking with hammer. If a tested stud fails at weld, all studs on the same beam or girder shall be tested by same procedure. Contractor shall replace studs that fail this test.

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.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099000 "Painting and Coating."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099000 "Painting and Coating."

END OF SECTION 051200

SECTION 052100 - STEEL JOIST 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. K-series steel joists.
2. Joist accessories.

1.3 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Welding certificates.

C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

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

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at service-load level, unless noted otherwise
2. Design joists to withstand design loads with deflections no greater than as indicated on the contract drawings.

2.2 K-SERIES STEEL JOISTS

A. Manufactured steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

1. Joist Type: K-series steel joists and KCS-type K-series steel joists.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

F. Camber joists according to SJI's "Specifications."

G. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.3 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

2.4 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

C. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

D. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated.

E. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.

1. Finish: Plain, uncoated.

F. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

G. Welding Electrodes: Comply with AWS standards.

H. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

I. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.5 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.

B. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing 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

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, as applicable:

a. Liquid Penetrant Inspection: ASTM E 165.
b. Magnetic Particle Inspection: ASTM E 709.
c. Ultrasonic Testing: ASTM E 164.
d. Radiographic Testing: ASTM E 94.

C. Visually inspect bolted connections.

D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.

E. Perform additional testing to determine compliance of corrected Work with specified requirements.

3.4 PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
2. Apply a compatible primer of same type as primer used on adjacent surfaces.

C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100

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. Composite deck.

B. Related Requirements:
   1. Section 033000 “Cast-in-Place Concrete” for normal-weight and lightweight structural concrete fill over steel deck
   2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

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. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. 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. Power-actuated mechanical fasteners.

D. Evaluation Reports: For steel deck.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Do not overload deck during construction by workers or storage of materials.

C. Rusted, crimped or bent deck shall not be installed in the work. Replace damaged deck with new material at no additional cost to the owner.

D. 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."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

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:
   1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
      a. Color: White
   2. Deck Profile: Type WR, wide rib.
   3. Profile Depth: As indicated
   4. Design Uncoated-Steel Thickness: As indicated
   5. Span Condition: Triple span or more.
   6. Side Laps: As indicated

2.3 COMPOSITE DECK

A. Composite Deck: Fabricate panels with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
   1. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
      a. Color: White
   2. Deck Profile: As Indicated
   3. Profile Depth: As indicated
   4. Design Uncoated-Steel Thickness: As indicated
   5. Span Condition: Triple span or more.
   6. Side Laps: As indicated

2.4 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 minimum diameter or as indicated on the Contract Drawings.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.

I. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747-inch-thick, with factory-punched hole of 3/8-inch minimum diameter.

J. Flat Sump Plates: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck. For drains, cut holes in the field.

K. Recessed Sump Pans: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck, with 3-inch- wide flanges and sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

L. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.

M. 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. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members as indicated on the Contract Drawings. Spacing of fasteners for composite deck shall not exceed 12 inches along each support, unless noted otherwise on the Contract Drawings.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 24 inches as indicated on the Contract Drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
   1. End Joints: Lapped 2 inches minimum.

D. 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 apart with at least one fastener at each corner.
   1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

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.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

G. Wet concrete stops at slab edge shall be upturned to top surface of slab to contain wet concrete. Provide stops of sufficient strength to remain stationary under wet concrete and construction work without distortion.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

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.

3.5 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.
   2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099000 "Painting and coating"

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099000 "Painting and coating"

D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

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. Exterior non-load-bearing wall framing.
   2. Interior non-load-bearing wall framing.
   3. Soffit framing.

B. Related Requirements:
   1. Section 061000 "Rough carpentry"
   2. Section 061611 “Sheathing Hunter”
   3. Section 07 21 00 “Thermal insulation”
   4. Section 092216 “Non structural metal framing:

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

   1. Cold-formed steel framing materials.
   2. Exterior non-load-bearing wall framing.
   3. Vertical deflection clips.
   4. Single deflection track.
   5. Drift clips.
   6. Post-installed anchors.
   7. Power-actuated anchors.
   8. Sill sealer gasket.
   9. Sill sealer gasket/termite barrier.

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.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Research Reports:

1. For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.
2. For sill sealer gasket/termite barrier, showing compliance with ICC-ES AC380.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association the Steel Framing Industry Association or the Steel Stud Manufacturers Association.

D. 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."

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 framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 at typical locations and 1/600 at locations supporting masonry of the wall height.
    b. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft..
    c. Ceiling Joist Framing: Vertical deflection of 1/240 of the span for live loads and 1/240 for total loads of the span.
3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    a. Upward and downward movement as indicated
5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60, A60, AZ50, or GF30.

B. Steel Sheet for Vertical Deflection Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.3 EXTERIOR NON-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: 0.0329 inch.
2. Flange Width: 1-5/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2.4 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation 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.

2.5 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.

B. Anchor Bolts: ASTM F1554, Grade 36, threaded carbon-steel hex-headed bolts, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor Torque-controlled adhesive anchor or adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A780/A780M.

B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

F. Sill Sealer Gasket/Termite Barrier: Minimum 68-mil nominal thickness, self-adhering sheet consisting of 64 mils of rubberized asphalt laminated on one side to a 4-mil- thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
   1. Physical Properties:

      a. Peel Adhesion: 17.0 lb/in of width when tested in accordance with ASTM D412.
      b. Low-Temperature Flexibility: Pass at minus 25 deg FASTM D146/D146M.
      c. Water Vapor Permeance: 0.05 perm maximum when tested in accordance with ASTM E96/E96M, Method B.
      d. Resistance to Termite Penetration: Comply with ICC-ES AC380.

2.7 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 screws 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 by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

   1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
   2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, 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 sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

B. Install sill sealer gasket/termite barrier in accordance with manufacturer's written instructions 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, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed 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, install according to Shop Drawings, and comply 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 equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to 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 framing-assembly 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.

3.4 INSTALLATION OF EXTERIOR NONLOADBEARING WALL FRAMING

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings or by delegated designer.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to bypassing studs and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 18 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at centers indicated on Shop Drawings.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTION

A. 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.

END OF SECTION 054000

SECTION 05 43 00
SLOTTED CHANNEL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

1.02 SECTION INCLUDES

A. Strut-type metal framing system, to be used for the following:
   1. To support mechanical equipment, electrical equipment, and devices.
   2. For structural applications as applicable.

1.03 REFERENCES

A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; 2012.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

   ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

D. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.

E. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2017.

F. ASTM A576 - Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality; 2025.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

H. ASTM A907 - Standard Specification for Steel, Sheet and Strip, Heavy-Thickness Coils, Carbon, Hot-Rolled, Structural Quality

I. 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; 2018a.

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

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

L. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

M. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete; 2021.

N. ASTM F1136 – Standard Specification for Chromium/Zinc Corrosion Protective Coatings for Fasteners

O. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

1.04 SUBMITTALS

A. Structural calculations by a Registered Professional or Structural Engineer in the State of Missouri. Calculations may include, but are not limited to:
   1. Description of design criteria
      a. Stress and deflection analysis
   2. Selection of framing members, fittings, and accessories.

B. Assembly drawings necessary to install the Strut System in compliance with the Contract Documents.

C. Pertinent manufacturers published data

1.05 QUALITY ASSURANCE

A. Manufacturer's qualifications:
   1. The manufacturer shall have at least 10 years experience in manufacturing Strut Systems.
   2. The manufacturer must certify in writing all components supplied have been produced in accordance with an established quality assurance program.

1.06 DELIVERY, STORAGE, AND HANDLING

A. All material is to be delivered to the work site in original factory packaging to avoid damage to the finish.

B. Store strut systems and components in original cartons and in clean dry space; protect from weather and construction traffic.

1.07 WARRANTY

A. Installer shall warrant for (1) year from the Date of Substantial Completion that the work will be free of defects in installation. In the event of any such defect in violation of the warranty, Installer shall have the option to repair or replace any such defective product.

B. Manufacturer shall warrant for 1 year from the Date of Substantial Completion that products will be free from defects in material or manufacture. In the event of any such defect in violation of the warranty, Manufacturer shall have the option to repair or replace any such defective product

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Unistrut Corporation. Other acceptable manufacturers with equivalent product to the specified manufacturer shall include:
   1. Haydon Corporation
   2. Cooper B-Line, Inc.
   3. Hilti, Inc.
   4. Flex-Strut, Inc.

B. Substitutions: See section 006325 Substitution Request.

2.02 FRAMING SYSTEM

A. Provide primary and secondary framing members, bridging, bracing, plates, gussets, clips, fittings, reinforcement, and fastenings as required to provide a complete framing system.

B. Design Criteria: Provide completed framing system having the following characteristics:
   1. Design: Calculate structural characteristics of cold-formed steel framing members according to AISI S100-12.
   2. Structural Performance: Design, engineer, fabricate, and erect to withstand specified design loads for project conditions within required limits.
   3. Design Loads: In accordance with applicable codes.
   4. Live load deflection meeting the following, unless otherwise indicated:
   5. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   6. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 MATERIALS

A. All channel members shall be fabricated conforming to one of the following ASTM specifications:
   1. Plain Carbon Steel: ASTM A1011/A1011M SS Grade 33
   2. Pre-Galvanized Carbon Steel: ASTM A653/A653M Grade 33
   3. UNISTRUT DEFENDER™: ASTM A1046 SS Grade 33

B. All fittings shall be fabricated conforming to one of the following ASTM specifications:
   1. Carbon Steel: All carbon steel fittings shall be fabricated from steel that meets/exceeds the physical requirements of ASTM A1011 SS Grade 33 and conforms to one of the following ASTM specifications:
      a. ASTM A575
      b. ASTM A576
      c. ASTM A36/A36M
      d. ASTM C635/C635M
      e. ASTM C1059/C1059M
      f. ASTM A1046

C. Stainless Steel:
   1. ASTM A240/A240M (Type 304 or Type 316)
   2. ASTM A276/A276M (Type 304 or Type 316)

D. Aluminum:
   1. ASTM B209 (Type 1100F or Type 5052-H32)

2.04 FASTENERS

A. Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A153M.

B. Welding: In conformance with AWS D1.1/D1.1M.

2.05 FINISHES

A. Electro-Galvanized per ASTM B633, Type III SC 1

B. Hot-Dipped Galvanized per ASTM A123/A123M or ASTM A153/A153M
   1. Zinc coated after all manufacturing operations are complete
   2. Zinc coating thickness shall be G65 (2.6 mils = 1.50 oz./ sq. ft. surface area)

PART 3 EXECUTION

3.01 EXAMINATION

A. The installer shall inspect the work area prior to installation. If work area conditions are unsatisfactory, installation shall not proceed until satisfactory corrections are completed.

B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION

A. Installation shall be accomplished by a fully trained manufacturer authorized installer.

B. Set Strut System components into final position true to line, level and plumb, in accordance with approved drawings.

3.03 CLEANING

A. Upon completion of this section of work, remove all protective wraps and debris. Repair any damage due to installation of this section of work.

3.04 PROTECTION

A. Upon completion of this scope of work, protect this work from damage during the remainder of construction on the project and until substantial completion.

END OF SECTION 05 43 00

SECTION 054400 – PRE-ENGINEERED COLD-FORMED STEEL TRUSSES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pre-engineered, prefabricated cold-formed steel open web roof trusses.

B. Anchorage, bracing and bridging.

1.2 RELATED SECTIONS

A. 051200 – Structural Steel: Structural building framing.

B. 053100 – Steel Decking.

C. 054000 – Cold-Formed Metal Framing.

1.3 REFERENCES

A. ASTM:
1. ASTM A653/A653M: Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Glavanealed) by the Hot Dip Process; latest edition.
2. ASTM A1008/1008M: “Steel, Sheet, Cold-Rolled; latest edition.
3. ASTM A780-93a: Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; latest edition.

B. American Welding Society (AWS)
1. AWS D1.1: Structural Welding Code - Steel; latest edition.
2. AWS D1.3: Structural Welding Code - Sheet Steel; latest edition.

C. Structural Building Components Association - Cold-Formed Steel Building Component Safety Information (CFSBCSI)

D. American Iron and Steel Institute (AISI)
1. AISI S100: North American Specification for the Design of Cold-Formed Steel Structural Members; latest edition.
2. AISI S214: Standard for Cold-Formed Steel Framing – Truss Design; latest edition.

1.4 PERFORMANCE REQUIREMENTS

A. AISI “Specifications”: Calculate structural characteristics of cold-formed steel truss members according to AISA S100: North American Specification for the Design of Cold-Formed Steel Structural Members.

B. Structural Performance: Design, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.
1. Design Loads: As specified.
2. Deflections: Live load deflection meeting the following (unless otherwise specified):
   a. Roof Trusses: Vertical deflection less than or equal to Length/240.
3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F (67 deg C).

1.5 SUBMITTALS

A. Refer to Section 013300 for general submittal requirements.

B. Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.

C. Submit detailed truss layouts indicating placement of trusses.

D. Submit individual truss drawings and calculations, sealed and signed by a qualified Professional Engineer licensed in the state in which the project is located, verifying accordance with local building code and design requirements. Include:
1. Description of design criteria and applied loads.
2. Engineering analysis depicting member stresses and truss deflection.
3. Truss member sizes and thickness and connections at truss joints.
4. Truss support reactions.
5. Top chord, bottom chord and Web bracing requirements.

E. Submit final plan drawings sealed and signed by a qualified Professional Engineer licensed in the state in which the project is located, depicting final installed truss assembly. Include:
1. All truss to truss connections.
2. All truss to structure (bearing) connections.
3. Plan and details for the location of all permanent lateral and diagonal bracing and/or blocking required in the top chord, web, and bottom chord planes. (Diaphragms excluded).
4. Field measurements of any as-built bearing conditions.

1.6 QUALITY ASSURANCE

A. Designer Qualifications: Design framing system under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.

B. Fabricator Qualifications: Fabrication shall be performed in a quality controlled manufacturing environment by a cold-formed steel truss fabricator with minimum 5 years experience fabricating Cold-Formed Steel trusses equal in material, design, and scope to the trusses required for this Project.

C. Installer qualifications: Installation of Cold Formed steel truss roof or floor assembly shall be performed by an installer with minimum 5 years experience installing Cold-Formed Steel trusses equal in material, design and scope to the trusses required for this Project.

D. Welding Standards
1. Comply with applicable provisions of AWS D1.1: Structural Welding Code – Steel and AWS D1.3: Structural Welding Code – Sheet Steel.
2. Qualify welding processes and welding operators in accordance with AWS Standard Qualification Procedure.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer’s unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.

B. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.

C. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

1.8 PROJECT CONDITIONS

A. Verify that field measurements are as indicated in the shop drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Aegis Metal Framing, LLC, www.Ultraspan.com (basis of design).

B. Tremco, Inc., www.tremcoroofing.com.

2.2 COMPONENTS

A. Shop-fabricated cold-formed steel roof truss and floor truss components.

B. Provide manufacturer's standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete cold-formed steel truss roof or floor assembly.

2.3 MATERIALS

A. Materials
   1. For all chord and web members : Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 50,000 psi.
   2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.

B. Truss components: Provide sizes, shapes and material thickness indicated in construction documents.

C. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60 coating.

D. Fastenings
   1. Manufacturer recommended self-drilling screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
   2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.
   3. Other fasteners as accepted by truss engineer.

2.4 FABRICATION

A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
   1. Fabricate truss assemblies in jig templates.
   2. Cut truss members by sawing or shearing or plasma cutting.
   3. Fasten cold-formed steel truss members by screw fastening, or other methods as standard with fabricator.
      a. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses. Refer to SBCA - CFSBCSI.

C. Fabrication Tolerances
   1. Overall Length: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows
      a. Truss length up to 30 ft.: 1/2" tolerance.
      b. Truss length over 30 ft.: 3/4" tolerance.
   2. Overall Height: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows:
      a. Truss height up to 5 ft.: 1/4" tolerance.
      b. Truss height over 5 ft.: 1/2" tolerance.
   3. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8".

2.5 ACCESSORIES

A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.

B. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.6 FASTENERS

A. Self-Drilling, Self-Tapping Screws, Bolts, Nuts and Washers: Hot dip galvanized per ASTM A153/A 153M.

B. Anchorage Devices: Power actuated.

C. Welding: In conformance with AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine structure, substrates and installation conditions. Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 INSTALLATION, GENERAL

A. General
   1. Erection of trusses, including proper handling, safety precautions, installation bracing and other safeguards or procedures is the responsibility of the Contractor and Contractor's installer. Refer to SBCA - CFSBCSI.
   2. Exercise care and provide installation bracing required to prevent toppling of trusses during erection. Where applicable, provide truss manufacturer's prefabricated bracing members for lateral bracing.

B. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.

C. Provide proper lifting equipment, including spreader bar, suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.

D. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.

E. Install trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
   1. DO NOT cut truss members without prior approval of truss engineer.
   2. Fasten cold-formed steel trusses by screw fastening, welding or other methods, as standard with fabricator.
      a. Comply with AWS 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 cold-formed truss manufacturer's instructions with screw penetrating joined members by not less than three exposed screw threads.
   3. Install trusses in one-piece lengths, unless splice connections are indicated.
   4. Provide installation bracing and leave in place until trusses are permanently stabilized.

F. Erection Tolerances:

1. Install trusses to a maximum allowable tolerance variation for level and true to line of 1/8 inch in 10 feet (1:960).
2. 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. Limit out-of-plane bow and plumb per SBCA – CFSBCSI.

G. Adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one truss.

3.3 ROOF TRUSS INSTALLATION

A. Install trusses per installation documents provided for in Section 1.5 (D)

B. Space trusses per sealed truss drawings.

C. Do not alter, cut, or remove truss members or connections of truss members.

D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.

E. Erect trusses without damaging truss members or connections.

F. Anchor trusses securely at all points of support, per installation documents provided for in Section 1.5 (D)

G. Install all continuous bridging and permanent truss bracing per installation documents provided for in Section 1.5 (D).

H. Perform all truss-to-truss connections per installation documents provided for in Section 1.5 (D).

3.4 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A780 and the manufacturer's instructions.

END OF SECTION 054400

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Miscellaneous steel framing, supporting angles, plates, brackets, clips, anchors and bolts for equipment, and other work which is not specifically included in other specifications, but which is required to complete the Project.

1.02 RELATED REQUIREMENTS

A. Section 05 43 00 - Slotted Channel Framing

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2020.

D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2018.

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

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

G. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

H. 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; 2018a.

I. ASTM B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings; 2018, with Editorial Revision.

J. ASTM B85/B85M - Standard Specification for Aluminum-Alloy Die Castings; 2018, with Editorial Revision.

K. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

L. ASTM B210/B210M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2019a.

M. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

N. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

O. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

P. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

Q. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

R. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

S. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2018.

T. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.

U. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

V. SSPC-SP 2 - Hand Tool Cleaning; 2024.

1.04 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
   2. Design data: Submit drawings and supporting calculations, signed and sealed by a qualified professional structural engineer.
      a. Include the following, as applicable:
         1) Design criteria.
         2) Engineering analysis depicting stresses and deflections.
         3) Member sizes and gauges.
         4) Details of connections.
         5) Support reactions.
         6) Bracing requirements.

B. Designer's Qualification Statement.

C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A36/A36M.

B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.

C. Plates: ASTM A283/A283M.

D. Pipe: ASTM A53/A53M, Grade B Schedule 40, black finish.

E. Stainless Steel, General: ASTM A666/A666M, Type 304.

F. Slotted Channel Fittings: ASTM A1011/A1011M.

G. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.

H. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.

I. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.

J. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

K. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209/B209M, 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210/B210M, 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B211/B211M, 6061 alloy, T6 temper.

E. Aluminum-Alloy Sand Castings: ASTM B26/B26M.

F. Aluminum-Alloy Die Castings: ASTM B85/B85M.

G. Bolts, Nuts, and Washers: Stainless steel.

H. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 FINISHES - STEEL

A. Prepare surfaces to be primed in accordance with SSPC-SP2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Prime Painting: One coat.

2.05 FINISHES - ALUMINUM

A. Class II Natural Anodized Finish: AAMA 611 AA-M12C22A31 Clear anodic coating not less than 0.4 mils thick.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Obtain approval prior to site cutting or making adjustments not scheduled.

END OF SECTION 05 50 00

SECTION 05 50 13
PIPE BOLLARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Steel Pipe Bollards.

1.03 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.04 REFERENCES

A. ASTM A36 – Standard Specification for Carbon Structural Steel.

B. ASTM A153/A153M -

1.05 SUBMITTALS

A. Setting Drawings: Show fabrication and installation details for metal fabrications.

B. Product Data: Provide for each type of bollard, component, finish, and accessory specified.

C. Color Samples: Submit manufacturer’s standard colors for selection. Submit sample of color specified.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Substitutions: Refer to Section 006325.

2.02 STEEL BOLLARDS

A. Material:
   1. Steel Sections: Hot-dip galvanized for exterior use, per ASTM A153/A153M.
   2. Steel Pipe: ASTM A 53/A 53M, Type S, Grade B, Schedule 40 round steel pipe
      a. Finish: Hot-dip galvanized for exterior use, per ASTM A153/A153M.

B. Standard Steel Pipe Bollard:
   1. Length: 72 inches
   2. Exposed Height Above Grade: 42 inches.
   3. Diameter: 6-inch (nom.), 6.625-inch O.D.

C. Accessory: Bollard Sleeve:
   1. Basis of Design: Emedco; Dome Top Bollard Cover #EBSL2R64YLWP02, or equivalent by Uline, Post Guard, or Grainger.
   2. Material: HDPE.
   3. Thickness: 1/8 inch.
   4. Mounting Type: Slide-Over Cover.
   5. Warranty: Fade-resistant for (6) years from the Date of Substantial Completion.

2.03 FINISH

A. Galvanizing: Hot-dip galvanize steel items, to comply with ASTM A153/A153M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine the substrate and conditions in which the work is to be installed. Correct unsatisfactory substrate and conditions prior to start of installation.

3.02 INSTALLATION

A. Pipe Bollards: Anchor bollards in place with concrete footings as detailed in Drawings. Center and align bollards in holes 6 inches (150 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

B. Accessories: Install dome top bollard cover in accordance with manufacturer's instructions.

3.03 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05 50 13

SECTION 05 51 33
METAL LADDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior metal ladders for roof hatch access.

B. Exterior metal ships ladder with crossover platform and return for vertical roof transitions

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 72 00 - Roof Accessories

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2008 (Reaffirmed 2018).

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.

E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

F. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.

G. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification; 2021.

H. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

I. AWS D1.2/D1.2M - Structural Welding Code - Aluminum; 2014, with Errata (2020).

J. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; 2018.

1.04 SUBMITTALS

A. Shop Drawings:
   1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

B. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

C. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is accredited under IAS AC172.

1.05 QUALITY ASSURANCE

A. Design metal ladders under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Missouri.

B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

C. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

1.06 WARRANTY

A. Manufacturer's Warranty: Manufacturer shall warrant the metal ladders to be free of defects in material and workmanship for five (5) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Aluminum Ladders:
   1. Specified Manufacturer: Alaco Ladder Company
      a. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
         1) O'Keeffe's, Inc.
         2) Precision Ladders, LLC.
         3) Royalite Manufacturing, Inc.
         4) UPNOVR, Inc.
         5) Cotterman Ladders
      b. Substitutions: See section 006325.

2.02 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B211/B211M, 6061 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209/B209M, 5005 alloy, H34 temper.

C. Bolts, Nuts, and Washers: Stainless steel.

D. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.03 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.04 INTERIOR ROOF HATCH ACCESS LADDERS

A. Aluminum Fixed Wall Ladder:
   1. Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   2. Components: Manufacturer's standard rails and rungs to comply with the requirements of the MATERIALS article of this section.
   3. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.
   4. Ladder Width: 20-inches, nominal
   5. Incline: 90 degrees.
   6. Distance from Wall: 7 inches.
   7. Ladder Height: Height from floor to top of roof hatch: Field verify each instance.
   8. Mounting Brackets: Manufacturer’s standard for mounting ladders to wall and floor.
   9. Finish: Mill finish.
   10. Product:
      a. Alaco; Model No. 560 Fixed Wall Ladder, or equivalent.
         1) Substitutions: See section 006325.

B. Aluminum Ship Ladder, :
   1. Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   2. Components: Manufacturer's standard rails, treads, and handrails to comply with the requirements of the MATERIALS article of this section.
   3. Materials: Aluminum; ASTM B211/B211M , 6061 alloy, T62 temper.
   4. Incline: 75 degrees.
   5. Ladder Width: 24 inches with handrails
   6. Ladder Height (from floor to top of roof hatch): Field verify each instance.
   7. Fabrication:
      a. Side Rails: Per manufacturer.
      b. Steps: 4-1/4 inch (108 mm) wide steps with nonslip ridges mounted on 12-inch (305 mm) centers.
      c. Handrails: 1-1/4 inch (32 mm) round serrated aluminum tubing with cast aluminum fittings.
      d. Mounting Brackets: Manufacturer’s standard for mounting ladders to wall and floor.
   8. Finish: Mill finish.
   9. Product:
      a. Alaco; Model No. H75 (370-75), 75-degree Ships Ladder, or equivalent.
         1) Substitutions: See section 006325.

C. Folding Ship Ladder, Manual Operation:
   1. Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
   2. Components: Manufacturer's standard rails, treads, and handrails.
   3. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.
   4. Incline: 70 degrees.
   5. Operation: Manual.
   6. Fabrication:
      a. Ladder includes side rails with 4-inch wide flat steps (with non-slip ridges), mounted 12 inches on-center vertically.
      b. Furnish with mounting bracket/slide assembly for flat storage against the wall.
      c. Provide non-marking solid rubber feet to secure the ladder at a 70º angle when extended.
      d. Furnish 1-1/4 inch round serrated aluminum handrails with cast aluminum fittings on both sides of the ladder
   7. Finish: Mill finish
   8. Product:
      a. Alaco; Model #HP70, 70-degree Folding Wall Ladder, or equivalent
         1) Substitutions: See section 006325.

2.05 EXTERIOR ALUMINUM LADDERS WITH RETURN AND CROSSOVER PLATFORMS

A. Aluminum Ship Ladder with Return and Crossover Platform:
   1. Product: O’Keeffe’s, Model 522-75, 75-Degree Angled Aluminum Ship Ladder with Platform and Return.
      a. Materials:
         1) Extrusions: Aluminum; ASTM B221 , Alloy 6063 , T6 temper.
         2) Sheets: Aluminum; ASTM B209/B209M , Alloy 5005 , H34 temper.
      b. Ladder Width: 24-inches.
      c. Ladder Height (from finished roof to top of parapet wall): Field verify each instance.
      d. Width of Parapet: As indicated on drawings.
      e. Capacity: 500 lbs (225 kg).
      f. Fabrication:
         1) Ship Ladders:

(a) Stringers: 2-inch by 6-inch by 1/8-inch aluminum extruded channels, spaced 24-inches apart.
(b) Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.
(c) Treads: Not less than 1-1/4 inches (32mm) high, 4-1/8 inches (105 mm) deep and 2-feet (610 mm) wide, aluminum extruded serrated treads secured to side rails.
(1) Tread spacing shall be 1 foot (305 mm) on-center.
(2) Material: Alloy, 6063-T5.
(d) Handrails: Schedule 40 aluminum pipe, not less than 1-1/2 inches (38 mm) in diameter with hemispheric end caps.

2) Crossover Platform:
(a) Stringers: 2-inch by 6-inch by 1/8-inch aluminum extruded channels, spaced 24-inches apart.
(b) Treads: 1-1/4 inches (32mm) high by 4-1/8 inch wide, serrated top aluminum treads secured to the stringers.
(1) Material: Alloy, 6063-T5.
(c) Walk-Through Guardrail: Schedule 40 aluminum pipe, not less than 1-1/2 inches (38 mm) in diameter with hemispheric end caps.

3) Mounting Brackets or Mounting Plates: Manufacturer’s standard to mounting to horizontal surfaces to secure crossover ladder.

2.06 ALUMINUM FINISH

A. Interior Aluminum Surfaces: Mill finish.

B. Exterior Aluminum Surfaces:Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, and in compliance with ANSI A14.3 and OSHA 1910.28.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 05 51 33

SECTION 06 10 00
ROUGH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Roof and wall sheathing.

B. Preservative-treated lumber and plywood materials.

C. Fire-retardant-treated lumber and plywood materials.

D. Communications and electrical room mounting boards.

E. Concealed wood blocking, nailers, and supports.

F. Miscellaneous wood nailers, furring, and grounds.

G. Dust Partitions.

1.03 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing

B. Section 07 41 13.16 - Standing-Seam Metal Roof Panels

C. Section 07 46 16 - Linear Metal Soffit and Wall Cladding Panels

D. Section 07 62 00 - Sheet Metal Flashing and Trim

E. Section 09 21 16 - Gypsum Board Assemblies

1.04 REFERENCES

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

B. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

C. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

D. ASTM D6329 - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers; 1998 (Reapproved 2015).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

F. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a.

G. AWPA U1 - Use Category System: User Specification for Treated Wood; 2018.

H. PS 1 - Structural Plywood; 2009 (Revised 2019).

I. PS 2 - Performance Standard for Wood Structural Panels; 2018.

J. PS 20 - American Softwood Lumber Standard; 2020.

K. SPIB (GR) - Grading Rules; 2014.

1.05 DEFINITIONS

A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NHLA: National Hardwood Lumber Association.
3. NLGA: National Lumber Grades Authority.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.06 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
   1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
   2. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
   3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in the Owner's name and registered with manufacturer.

1.07 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:
   1. Fire-retardant-treated wood.
   2. Power-driven fasteners.
   3. Powder-actuated fasteners.
   4. Metal framing anchors.

1.08 QUALITY ASSURANCE

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

B. Wood Treatment Plant Qualifications: Wood treatment plant experienced in performing work of this section licensed by Fire Retardant Chemical Technology.

C. Source Quality: Obtain treated wood products from a single approved source.

D. Fire-Retardant Treatment: Mark each piece of plywood and lumber to show Compliance with specified standards.

E. Regulatory Requirements: Provide for retardant treatment which complies with the following regulatory requirements:
   1. International Building Code (IBC).

F. Independent Third Party Inspection:
   1. Provide plant inspections.

1.09 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 manufacturer's recommended limits.

1.10 WARRANTY

A. Provide five year manufacturer warranty for each type of chemical treatment.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. All products must meet BABAA requirements, per Section 01 60 00 - Product Requirements.

B. Dimension Lumber: Comply with DOC PS 20 and requirements of specified grading agencies.
   1. Species: Douglas Fir-Larch, unless otherwise indicated.
   2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
   3. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Stud Framing (2 by 2 through 2 by 6):
   1. Species: Douglas Fir-Larch.
   2. Grade: No. 2.

E. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

A. Roof Sheathing: PS 2 type, rated Structural I Sheathing.
   1. Bond Classification: Exterior.
   2. Span Rating: 60.
   3. Performance Category: 3/4 PERF CAT.

B. Wall Sheathing, Parapet Walls (backside): Plywood, PS 1, Grade C-D, Exposure I.

C. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
   1. Product: G-P Gypsum; DensGlass® Gold Sheathing
   2. Fire-Rating (if applicable): At assemblies indicated with fire rating, use type required by indicated tested assembly.
   3. Surfacing: Fiberglass mat on the face, back, and long edges.
   4. Thickness: 5/8-inch
   5. Edges: Square.
   6. Physical Properties:
      a. Compressive Strength: 500 psi (3445 kPa), minimum.
      b. Permeance (ASTM E96/E96M): Not less than 23 perms.
      c. Mold Resistance (ASTM D3273): Score of 10
      d. Microbial Resistance (ASTM D6329): Will not support microbial growth
      e. Air Barrier Compliance: Per the International Energy Conservation Code® (IECC), gypsum sheathing shall comply with the prescriptive code language for use as a continuous air barrier when the joints and openings are properly sealed.

D. Plywood Backing Panels: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.04 FASTENERS

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

1. Where carpentry is exposed to moisture, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

B. Screws for Fastening to Metal Framing: ASTM C 1002 or ASTM C 954, length as recommended by screw manufacturer for material being fastened.

2.05 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
   1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
   2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment of Lumber and Plywood:
   1. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
   2. Basis of Design: Viance, LLC; D-Blaze FRT (www.treatedwood.com), or equivalent product by the following manufacturers:
      a. Lonza Group: www.wolmanizedwood.com
      b. Hoover Treated Wood Products, Inc: www.frtw.com
      c. Koppers, Inc: www.koppersperformancechemicals.com
      d. Substitutions: See section 006325.
   3. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat exterior rough carpentry items.
      c. Do not use treated wood in direct contact with the ground.
   4. Interior Type: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Interior rough carpentry items are to be fire retardant treated.

C. Preservative Treatment of Lumber and Plywood:
   1. Basis of Design: Viance, LLC; Preserve ACQ (www.treatedwood.com), or equivalent product by the following manufacturers:
      a. Lonza Group: www.wolmanizedwood.com.
      b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com.
      c. Substitutions: See section 006325.
   2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
   3. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.

4. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
    a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.

PART 3 EXECUTION

3.01 PREPARATION

3.02 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on-site as accessory components, including shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 INSTALLATION OF FIRE-RETARDANT-TREATED WOOD MATERIALS

A. Fire-Retardant Treated Wood:
1. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
2. End cuts and drilling are permitted. Do not rip or mill lumber after fire-retardant treatment.

3.04 INSTALLATION OF WOOD BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In metal stud framed assemblies, provide blocking attached to studs as backing and support for all wall-mounted items, unless those items can be securely fastened to two or more studs, or another method of support is explicitly indicated. Blocking shall be provided for the following:
1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Washroom accessories.
6. Wall-mounted door stops.
7. Tack boards and marker boards.
8. Wall paneling and trim.
9. Joints of rigid wall coverings that occur between studs.
10. Other equipment where indicated on the drawings.

C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above the ceiling, unless another method of support is explicitly indicated.

3.05 INSTALLATION OF CONSTRUCTION PANELS

A. Exterior sheathing and its attachment to the back-up support framing must be designed to resist 100% of the negative design wind pressure.

B. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.
1. At long edges use sheathing clips where joints occur between roof framing members.
2. At long edges provide solid edge blocking where joints occur between roof framing members.
3. Screw panels to framing.

C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.

D. Plywood Backing Panels: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
   1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
   2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
   3. Install adjacent boards without gaps.
   4. Size and Location: As indicated on drawings.

3.06 SITE-APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.07 CLEANING

A. Waste Disposal:
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave wood, shavings, sawdust, etc. on the ground or buried in fill.

END OF SECTION 06 10 00

SECTION 06 15 00
PLYWOOD SHEATHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Parapet wall and coping sheathing.

B. Fire retardant treatment of exterior plywood (when applicable).

C. Preservative treatment of exterior plywood.

1.02 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

B. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 2010 (Reapproved 2017).

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

D. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

E. PS 1 - Structural Plywood; 2009 (Revised 2019).

1.03 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings (when applicable): As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

1.04 SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

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

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Capable of demonstrating that all wood procurement operations are conducted in accordance with procedures and policies of the Sustainable Forestry Initiative (SFI) Program.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Outdoor Storage: Comply with manufacturer’s recommendations:
   1. Set panel bundles on supports to keep off ground.
   2. Cover panels loosely with waterproof protective material.
   3. Anchor covers on top of the stack, but keep away from sides and bottom to assure adequate air circulation.
   4. When high moisture conditions exist, cut banding on the panel stack to prevent edge damage.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Manufacturers: Subject to compliance with the Contract Documents, provide products of the following manufacturers:
   1. Boise Cascade Company.

2. Georgia-Pacific LLC.
3. Weyerhaeuser Company.

B. Products of unnamed manufacturers with equivalent products to the manufacturers listed will be considered in accordance with the “or equal” provision specified in Section 006325.
1. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”.

2.02 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.03 PLYWOOD SHEATHING

A. Plywood Sheathing: DOC PS 1 veneer plywood; Exterior Grade; APA Structural I; Exposure 1 sheathing
1. Thickness: 5/8-inch.
2. Edge Profile: Square Edge.
a. Parapet Wall Sheathing: Square edge.

2.04 ACCESSORIES

A. Fasteners and Anchors: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M or of Type 304 stainless steel.

2.05 PLYWOOD TREATMENT

A. Factory-Treated Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire-Retardant Treatment (if applicable):
1. Manufacturers:
a. Hoover Treated Wood Products, Inc: www.frtw.com/#sle.
b. Lonza Group: www.wolmanizedwood.com/#sle.
c. Koppers, Inc: http://www.koppersperformancechemicals.com/#sle.
d. Osmose Utilities Services, Inc: www.osmose.com/#sle.
e. Viance, LLC; D-Blaze: www.treatedwood.com/#sle.
f. Substitutions: See section 006325.
2. Exterior Type: AWPA U1, Use Category UCFB, Commodity Specification H, chemically treated and pressure impregnated; with a maximum flame spread index of 25 when tested following ASTM E84 and with no evidence of significant combustion when the test is extended for an additional 20 minutes both before and after accelerated weathering test performed following ASTM D2898.
a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.

C. Preservative Pressure Treatment:
1. Manufacturers:
a. Lonza Group: www.wolmanizedwood.com/#sle.
b. Osmose Utilities Services, Inc: www.osmose.com/#sle.
c. Viance, LLC: www.treatedwood.com/#sle.
2. Plywood: AWPA U1, Use Category UC2, and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.
a. Kiln dry plywood after treatment to a maximum moisture content of 18 percent.

3. Marking: Mark each piece with a stamp of an ALSC-accredited testing agency, certifying level and type of treatment following AWPA standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that support framing is ready to receive plywood roof and parapet wall sheathing.

3.02 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment following the manufacturer's instructions.

B. Brush apply one coat of preservative treatment on wood in contact with roofing and related metal flashings. Treat site-sawn cuts.

C. Allow preservative to dry before erecting members.

3.03 PARAPET SHEATHING INSTALLATION

A. Install sheathing on the backside of the parapet walls following the manufacturer's instructions.

END OF SECTION 06 15 00

SECTION 06 16 00
GLASS-MAT GYPSUM SHEATHING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SECTION INCLUDES

A. Fiberglass-mat faced moisture and mold-resistant gypsum sheathing.

1.03 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing

B. Section 07 27 26 - Fluid-Applied Membrane Air Barriers - Dow **

1.04 REFERENCES

A. ASTM D 5516 - Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.

B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.05 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Product Data:
   1. Manufacturer's data sheets on each product to be used.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Typical installation methods.
   5. Design data.
   6. Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.

C. Shop Drawings: Include details of materials, construction, and finish. Include relationship with adjacent construction.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum of five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with a minimum of two years documented experience with projects of similar scope and complexity.

C. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store and handle in strict compliance with manufacturer's written instructions and recommendations.

1.08 WARRANTY

A. The manufacturer shall warrant the product against in-place exposure damage (delamination, deterioration, and decay) for a period of one (1) year from the date of Substantial Completion.

B. The manufacturer shall warrant the product against defects in manufacturing, for a period of five (5) years from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Georgia-Pacific (G-P) Gypsum Corp.

1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
    a. CertainTeed Corporation; GlasRoc
    b. National Gypsum Company; Gold Bond e(2)XP
    c. Temple-Inland Inc.; GreenGlass
    d. United States Gypsum Co.; Securock
2. Products of unnamed manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Section 006325.
    a. Product Substitutions: Comply with the requirements specified in Section 006325 - Substitution Procedures.

2.02 GYPSUM SHEATHING

A. Product: G-P Gypsum; DensGlass® Gold Sheathing
1. Fiberglass-Mat Faced Gypsum Sheathing: ASTM C1177/C1177M, Type X.
2. Thickness: 5/8-inch
3. Edges: Square
4. Surfacing: Fiberglass mat on the face, back, and long edges.
5. Width (nom.): 48-inches
6. Length: 8-, 9-, or 10-feet
7. Physical Properties:
    a. Permeance (ASTM E96/E96M): Not less than23 perms.
    b. R-Value (ASTM C518): 0.56.
    c. Mold Resistance (ASTM D3273): Passes
    d. Microbial Resistance (ASTM D6329): Will not support microbial growth
    e. Air Barrier Compliance: Per the International Energy Conservation Code® (IECC), gypsum sheathing shall comply with the prescriptive code language for use as a continuous air barrier when the joints and openings are properly sealed.
8. Performance Characteristics:
    a. Combustibility: The sheathing panels are considered non-combustible building materials in accordance with IBC Section 703.5 based on testing in accordance with ASTM E136.
    b. Surface Burning Characteristics: The sheathing panels are considered Class A building materials complying with IBC Section 803.1 based on testing per ASTM E84.
    c. Wind Resistance: The sheathing panels may be used to resist transverse wind loads as permitted by the applicable code for gypsum sheathing.
    d. Shear Resistance: The sheathing panels may be used as a component of engineered shear walls when designed per IBC Section 2211.6 for light-gauge steel-framed walls.

2.03 ACCESSORIES

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. For roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for the thickness of sheathing to be attached, according to ASTM B117
1. For steel framing less than 0.0329 inches (0.835 mm) thick, use screws that comply with ASTM C1002.
2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, use screws that comply with ASTM C954.

PART 3 EXECUTION

3.01 INSTALLATION

A. Following GA-253, ASTM C1280, and the manufacturer's written instructions.

B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through the completed assembly.

C. Do not bridge building expansion joints; cut and space edges of panels to match the spacing of structural support elements.

D. Coordinate sheathing installation with the installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

E. Apply fasteners so heads bear tightly against the face of sheathing, but do not cut into facing.

F. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with the groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at the perimeter and within the field of the board to each steel stud.

G. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at the perimeter and within the field of the board to each stud. Space fasteners approximately 8 inches (200 mm) o.c. and setback a minimum of 3/8 inch (9.5 mm) from the edges and ends of boards.

H. Seal sheathing joints according to the sheathing manufacturer's written instructions.

3.02 PROTECTION

A. Protect gypsum sheathing that will be exposed to the weather for more than 180 days by covering the exposed exterior surface of sheathing with a securely fastened air-infiltration barrier. Apply covering immediately after sheathing is installed. Maximum exposure of assembly is 270 days before covering with exterior wall covering.

END OF SECTION 06 16 00

SECTION 06 16 11
SHEATHING - HUNTER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sheathing wall system.

1.02 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

B. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a.

C. PS 2 - Performance Standard for Wood Structural Panels; 2018.

1.03 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Samples: Two samples, 12 by 12 inches in size illustrating components thickness, color, and general appearance.

C. Certificate: Certify products of this section meet or exceed specified requirements.

D. Manufacturer's qualification statement.

E. Testing agency's qualification statement.

F. Executed warranty.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with minimum 3 years of documented experience. Manufacturer regularly manufactures and assembles specified insulation in house with no outside fabrication operations and has multiple manufacturing facilities to ensure consistency of product supply.

B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of type specified in this section.

1.05 FIELD CONDITIONS

A. Ambient Conditions: Do not install water-resistive barrier to damp, frozen surfaces or during rainy conditions.

1.06 WARRANTY

A. Manufacturer Warranty: Provide 15-year manufacturer warranty for products, compatibility of materials, and measured thermal resistance. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hunter Panels: www.hunterpanels.com/#sle.

B. Other acceptable manufacturers
   1. Energy Shield Ply Pro
   2. RMax; A sika company

2.02 SHEATHING WALL SYSTEM

A. Description: Closed-cell insulation bonded to glass facer on one side and wood sheathing panel on other side; adhered air and water-resistive barrier.
   1. Sheathing Panel Type: PS 2, Exposure 1.
   2. Sheathing Material: Plywood.
   3. Fire Rating Class: Class A.

4. Grade: Structural 1.
5. Thickness: 5/8 inch.
6. Size: 4 by 8 feet.
7. Insulation Thickness: 2.1" Overall Assembly R-Value 7.5 minimum.
8. Flame Spread and Smoke Developed Indexes: Maximum 75 and 450 respectively in accordance with ASTM E84.
9. Water Vapor Permeance: 15 perms, minimum, when tested in accordance with ASTM E96/E96M, procedure B.
10. Products: Hunter Panels; Hunter Xci Ply.

2.03 ACCESSORIES

A. Fasteners: Manufacturer approved, corrosion resistant with oversized heads. Length as recommended by panel manufacturer.

B. Flashing and Sealant: Manufacturer's standard sill flashing, silicone and foam sealants.

C. Seam Tape: Manufacturer's standard pressure-sensitive, self-adhering, and cold-applied.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing framing is installed according to manufacturer's recommendations prior to sheathing application.

B. Verify mechanical and electrical services in walls have been installed and tested.

C. Verify adjacent materials and finishes are dry and ready to receive insulation.

3.02 PREPARATION

A. Prepare and clean surfaces with manufacturer recommended methods to achieve substrate conditions for project.

B. If wall assembly preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Clean surfaces thoroughly prior to installation.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions. Select material sizes to minimize waste. Reuse scrap to greatest extent possible; clearly separate scrap for use on site as accessory components, including shims, bracing, and blocking.

3.04 CLEANING

A. See Section 013300 for additional requirements.

B. Do not leave wood, shavings, sawdust, and other debris on ground or buried in fill.

END OF SECTION 06 16 11

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Finish carpentry items, including:
   1. Wood door frames, glazed frames.
   2. Wood casings and moldings.
   3. Hardware and attachment accessories.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Support framing, grounds, and concealed blocking.

B. Section 08 80 00 - Glazing :

C. Section 09 90 00 - Painting and Coatings

1.04 REFERENCE STANDARDS

A. AWI (QCP) - Quality Certification Program; Current Edition.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data:
   1. Provide manufacturer's product data, storage and handling instructions for factory-fabricated units.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
   3. Include certification program label.

D. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

E. Manufacturer's Instructions: Provide manufacturer's installation instructions for factory-fabricated units.

1.06 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project within the past 5 years with value of woodwork within 20 percent of cost of woodwork for this project.
   2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
   3. Single Source Responsibility: Provide and install this work from single fabricator.

B. Quality Certification:
   1. Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section: www.awiqcp.org/#sle.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Protect from moisture damage.

B. Handle materials and products to prevent damage to edges, ends, or surfaces.

PART 2 PRODUCTS

2.01 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

B. Surface Burning Characteristics: Provide materials having fire and smoke properties as required by applicable code.

C. Interior Woodwork Items:
   1. Miscellaneous Trim: Clear white pine; prepare for paint finish.
   2. Window Sills and Aprons: Clear fir; prepare for paint finish.

2.02 FASTENINGS

A. Adhesive for factory-fabricated units: Manufacturer's recommended adhesive for application.

B. Fasteners: Of size and type to suit application.

2.03 ACCESSORIES

A. Adhesive: Type recommended by fabricator to suit application.

B. Glass: As specified in Section 08 80 00.

C. Wood Filler: Solvent base, tinted to match surface finish color.

2.04 WOOD TREATMENT

A. Fire Retardant Treatment (FR-S Type): Chemically treated and pressure impregnated; capable of providing flame spread index of 25, maximum, and smoke developed index of 450, maximum, when tested in accordance with ASTM E84; _____ manufactured by _____.

2.05 SITE FINISHING MATERIALS

A. Finishing: Field finished as specified in Section 09 90 00.

2.06 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

3.02 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) requirements for grade indicated.

B. Install factory-fabricated units in accordance with manufacturer's printed installation instructions.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09 90 00.

3.04 TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

END OF SECTION 06 20 00

SECTION 06 61 16
SOLID SURFACE FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Solid surfacing countertops

B. Integral solid surface sink bowls.

C. Solid surface transaction tops.

D. Solid surface window sills.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 92 00 - Joint Sealants

C. Section 12 32 16 - Manufactured Plastic-Laminate-Clad Casework

1.03 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

B. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Shop Drawings: Indicate dimensions, thicknesses, required clearances, tolerances, materials, colors, finishes, fabrication details, field jointing, adjacent construction, design load parameters, methods of support, integration of plumbing components, and anchorages.

C. Product Data: Include color, pattern, and material properties.

D. Manufacturer's Installation Instructions: Indicate preparation of opening required, rough-in sizes; provide templates for cast-in or placed frames or anchors; tolerances for item placement, temporary bracing of components , and _____.

E. Maintenance Data: Indicate list of approved cleaning materials and procedures required; list of substances that are harmful to the component materials.
   1. Include instructions for stain removal, surface, and gloss restoration .

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Polishing Cream: 16 oz.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the site in original packages, containers or bundles bearing brand name and identification. Protect from damage by retaining shipping protection in place until installation.

B. Handle products to prevent damage to edges, ends, or surfaces.

1.07 WARRANTY

A. Manufacturer Warranty: The manufacturer shall warrant the product/s to be free of defects in material and workmanship for (10) years from the Date of Substantial Completion.

B. Installation Warranty: The installing subcontractor shall warrant the installation to be free of defects in material and workmanship for (1) year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: the manufacturers listed in the "Interior Finish Legend" in the Drawings.

B. Other Allowable Manufacturers:
   1. Corian
   2. Lx Hausys, Hi-Macs
   3. Nevamar

2.02 MATERIALS

A. Cast Polymer:
   1. Provide finished products having flame spread index of 35 and smoke developed index of 15, when tested in accordance with ASTM E84 in thickness of 3/4 inch.
   2. Resin: Polyester; integrally-colored, stain-resistant and resistant to domestic chemicals and cleaners.
   3. Filler Material: ASTM E84 Class A rated.
   4. Polishing Cream: Compatible polishing cream to achieve specified sheen to gel coat.

B. Solid Surfacing - General:
   1. Applications: Countertops, Work Counters, Lavatory Countertops, Window Sills, and Sinks.
   2. Solid Surfacing Fabrications are designated in the Drawings as Finish Type SS- #.
      a. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information
   3. Materials: Homogeneous compression-molded material composed of reacted monomers, resins, mineral fillers, and pigments; manufactured into sheets.
   4. Surface Burning Characteristics: Flame spread index of 25 maximum; smoke developed index of 450 maximum; when tested in accordance with ASTM E84.

C. Solid Surfacing,Type SS-1, SS-2,...as scheduled on the "Interior Finish Legend":
   1. Product: As scheduled
      a. Solid Surfacing Type: Standard; as classified by ISFA 2-01.
      b. Sheet Size: Per manufacturer.
      c. Sheet Thickness: 1/2 inch.
      d. Texture: As scheduled.
      e. Pattern: As scheduled.
      f. Color/s: As scheduled.

2.03 INSTALLATION MATERIALS

A. Mounting Adhesive: As recommended by the manufacturer for application; not containing formaldehyde or other volatile organic compounds.

B. Fasteners: Of size and type to suit application.

C. Concealed Joint Fasteners: Threaded steel.

2.04 FABRICATION

A. Design casework items with sufficient strength for handling and placement stresses.

B. Fabricate components by mold to achieve shape and configuration.

C. Gel coat the finish exposed surfaces smooth and polish to a gloss sheen.

D. Radius corners and edges.

E. Cure components prior to shipment.

F. Label _____ units to facilitate correct position of assembly in field.

2.05 COUNTERTOPS

A. Countertops shall be built up with a 1/2-inch thick solid surface sheet over a 1-inch thick MDF (or MR-MDF) sub-top.
   1. Edge Thickness: 1-1/2 inches.

B. Edge Profile: Eased edge unless otherwise indicated.

C. Depth: As indicated on the Drawings.
   1. Countertops requiring compliance with ADA shall have a maximum depth of 24-inches (600-mm) from the farthest most projection of cabinetry to the face of back wall.

D. Overhang: 1-inch (25-mm) beyond face of base cabinets.

E. Open End Radii: Countertops with open ends shall have a 1-1/2 inch radius at the open end between the front and end faces.

F. Splashes (Back-, Side-, and End-):
   1. Material and Color: Match countertops.
   2. Height: 4-inches high unless indicated otherwise.
   3. Thickness: 1/2-inch (12-mm).
   4. Splash Type:
      a. Shop-formed integral splashes with coved assembly between horizontal and vertical surfaces.
         1) Coved strip assembly shall be recessed into the deck 3-mm to eliminate 'feather' at glue line.
         2) Provide a formed scribe strip at top of splash to permit scribing to wall surface.
         3) L-Shaped Returns: Shop-fabricated inside corner cove.
      b. Field-Applied Backsplashes: Provide loose fabrications to be field set, unless noted otherwise.
         1) Backsplashes and returns are attached to countertop with silicone adhesive.

G. Sinks: Refer to the "Integrated Solid Surface Sinks" Article in this Section.

2.06 WINDOW SILLS

A. Solid Surface Material Type: As scheduled.

B. Thickness: 1/2-inch

C. Sill Depth: As indicated on drawings.

D. Overhang: 1/2-inch

E. Length: Field verify

F. Edges: Eased Edges.

2.07 INTEGRATED SOLID SURFACE SINKS

A. Products: Solid Surface Acrylic Sinks, as manufactured by (TBD), no substitutions.
   1. Description: Injection molded and specially shaped solid surface products commonly used as countertop sinks, kitchen sinks, and lavatory bowls.
   2. Composition: Solid Surface Sinks and Bowls are composed of a proprietary acrylic resin and minerals, are completely homogeneous, and the color has a uniform pigment throughout the thickness of each bowl.
   3. Sizes: As scheduled below.
   4. Color: Refer to Interior Finish Legend

B. Mounting of Sinks to Countertop:
   1. Hard Seam Undermount Installation: Where the edge of the deck and the sink bowl are flush, and the sink bowl is attached to the deck with adhesive.
      a. Rout the cutout for the sink in the countertop.
      b. Adhere bowl positioning blocks into position against the bowl with hot-melt adhesive.
      c. Adhere undermount sink to countertop using manufacturer's recommended adhesive.

d. Use clamping devices to hold bowl until adhesive sets.

C. Integrated Solid Surface Sinks are designated in the Drawings as FinishType IS- #
   1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that joint preparation and affected dimensions are acceptable.

C. Do not begin installation until substrates have been properly prepared.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Provide anchoring devices for installation .

D. Provide templates and rough-in measurements.

3.03 INSTALLATION

A. Install components in accordance with approved shop drawings and manufacturer's instructions.

B. Align work plumb and level.

C. Rigidly anchor to substrate to prevent misalignment.

3.04 TOLERANCES

A. Maximum Variation From True Dimension: 1/8 inch.

B. Maximum Offset From True Position: 1/8 inch.

3.05 CLEANING

A. Clean and polish surfaces in accordance with manufacturer's instructions.

3.06 PROTECTION

A. Protect installed Work from subsequent construction operations until Substantial Completion. Provide protective coverings to prevent physical damage or staining following installation.

B. DO NOT stand on the installed countertops for any reason.

END OF SECTION 06 61 16

SECTION 07 05 53
FIRE AND SMOKE ASSEMBLY IDENTIFICATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies

B. Section 09 90 00 - Painting and Coatings

1.03 REFERENCE STANDARDS

A. ICC (IBC) - International Building Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.

C. Schedule: Completely define scope of proposed marking, and indicate location of affected walls and partitions, and number of markings.

D. Samples: Submit two samples of each type of marking proposed for use, of size similar to that required for project, illustrating font, wording, and method of application.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 FIELD CONDITIONS

A. Do not install adhered markings when ambient temperature is lower than recommended by label or sign manufacturer.

B. Do not install painted markings when ambient temperature is lower than recommended by coating manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Partition Identification Labels:
   1. Fire Wall Signs, Inc: www.firewallsigns.com/#sle.
   2. Safety Supply Warehouse, Inc: www.safetysupplywarehouse.com/#sle.
   3. Substitutions: See section 006325.

2.02 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

A. Regulatory Requirements: Comply with "Marking and Identification" requirements of "Fire-Resistance Ratings and Fire Tests" chapter of ICC (IBC).

B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl or paper sign with factory applied adhesive backing.

C. Applied Fire and Smoke Assembly Identification: Identification markings applied to partition with paint and a code compliant stencil. See Section09 90 00 for products.

D. Languages: Provide sign markings in English.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 PREPARATION

A. See Section 09 90 00 for substrate preparation for painted markings.

3.03 INSTALLATION

A. Locate markings as required by ICC (IBC).

B. Install adhered markings in accordance with manufacturer's instructions.

C. Install neatly, with horizontal edges level.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged markings.

END OF SECTION 07 05 53

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Board insulation at cavity wall construction, perimeter foundations, underside of floor slabs, over roof deck, and exterior wall continuous insulation over sheathing.

B. Batt insulation (faced or unfaced) in exterior wall construction.

C. Sound Attenuation Batt insulation for filling interior wall construction.

D. Cellular glass structural insulating block.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 54 23 - Thermoplastic Membrane Roofing

1.03 REFERENCE STANDARDS

A. ASTM C272/C272M - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions; 2018.

B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

C. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2016.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a.

F. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

G. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

H. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2018.

I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.04 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

B. ABAA Field Quality Control Submittals: Submit third-party reports of testing and inspection required by ABAA QAP.

C. ABAA Manufacturer Qualification: Submit documentation of current evaluation of proposed manufacturer and materials.

D. ABAA Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of contractor accreditation and installer certification on project site during and after installation. Present on-site documentation upon request.

1.05 QUALITY ASSURANCE

A. Air Barrier Association of America (ABAA) Quality Assurance Program (QAP); www.airbarrier.org/#sle:

1. Installer Qualification: Use accredited contractors, certified installers, evaluated materials, and third-party field quality control audit.

2. Manufacturer Qualification: Use evaluated materials from a single manufacturer regularly engaged in air barrier material manufacture. Use secondary materials approved in writing by primary material manufacturer.

1.06 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.

B. Insulation at Perimeter of Foundation: Expanded polystyrene (EPS) board.

C. Metal-Framed Exterior Wall Construction:
   1. Stud Cavity Insulation: Fiberglass batt insulation, faced or unfaced.
   2. Continuous Insulation:
      a. Polyisocyanurate Board Insulation: Polyiso shall be installed over exterior wall sheathing for the following
         1) Masonry veneer wall cladding.
         2) Metal panel wall and soffit cladding.
      b. Expanded Polystyrene Board Insulation:
         1) Exterior Insulation and Finish Systems (EIFS).

D. Metal-Framed Interior Wall Construction:
   1. Stud Cavity Insulation: Sound attenuation batt insulation, unfaced.
   2. Wall Furring Systems (if applicable): Extruded polystyrene rigid board insulation.

E. Roofing System Insulation: Polyisocyanurate rigid board insulation, flat or tapered.

F. Cellular Glass Structural Insulating Block: For use under first coarse of non-load-bearing masonry veneers to prevent thermal bridging between below grade and above grade continuous insulation.

2.02 FOAM BOARD INSULATION MATERIALS

A. Expanded Polystyrene (EPS) Board Insulation: Complies with ASTM C578.
   1. Board Thickness: Thickness as required to comply with the applicable Energy Conservation Code for the applications specified.
   2. Board Edges: Square.
   3. Properties:
      a. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
      b. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
      c. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
      d. Board Size: 48 inch by 96 inch.
      e. Board Thickness: As indicated in Drawings.
      f. Board Edges: Square.
      g. Water-Resistive Barrier: Integrated film facer on insulation.
      h. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
      i. Type and Water Absorption: Type IV, 0.30 percent by volume, maximum, by total immersion.
      j. Thermal Resistance, R-value: R-4.2 (0.74) minimum, minimum, per 1 inch thickness at 75 degrees F mean temperature.
   4. Manufacturers/ Products:

a. Atlas Molded Products, a Division of Atlas Roofing Corporation; ThermalStar EPS Wall Insulation Board: www.atlasmoldedproducts.com/#sle.
b. Diversifoam Products: www.diversifoam.com/#sle.
c. InsulFoam LLC; R-Tech EPS: www.insulfoam.com/#sle.
d. InsulFoam LLC; InsulFoam Below Grade Insulation: www.insulfoam.com/#sle.
e. Substitutions: See section 006325.

B. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
1. Applications:
a. Slab-on-grade and perimeter foundation insulation.
b. Interior wall furring systems.
2. Properties:
a. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
b. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
c. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
d. Thermal Resistance, R-value: R-5.0 (0.88), minimum, per 1 inch thickness at 75 degrees F mean temperature.
e. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
f. Board Edges: Square.
g. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
h. Board Thickness: Thickness as required to comply with the applicable Energy Conservation Code for the applications specified.
3. Manufacturers/ Products:
a. DuPont de Nemours, Inc; Styrofoam Brand XPS: building.dupont.com/#sle.
b. Kingspan Insulation LLC; GreenGuard XPS Type IV, 25 psi: www.kingspan.com/#sle.
c. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: www.ocbuildingspec.com/#sle.
d. Substitutions: See section 006325.

C. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
1. Applications:
a. Exterior CI for installation over wall sheathing/s.
b. Insulation in the cavity space of masonry veneer assemblies.
c. Roof Deck Insulation - Refer to Section 07 54 23, for requirements.
2. Classifications:
a. Type II:
1) Class 2 - Faced with coated polymer-bonded glass fiber mat facers on both major surfaces of core foam.
2) Compressive Strength (ASTM D1621): Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.
3) Thermal Resistance: R-value of R-6.0 (1.05) per 1 inch at 75 degrees F mean temperature.
3. Properties:
a. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
b. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

c. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
d. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
e. Board Size: 48 inch by 96 inch.
f. Board Thickness: 1.5 inch.
g. Board Edges: Square.
h. Products:
1) DuPont de Nemours, Inc: building.dupont.com/#sle.
2) GAF: www.gaf.com/#sle.
3) Hunter Panels: www.hunterpanels.com/#sle.
4) Johns Manville: www.jm.com/#sle.
5) Rmax Inc: www.rmax.com/#sle.
6) Substitutions: See section 006325.

2.03 CELLULAR GLASS STRUCTURAL INSULATING BLOCK

A. Basis of Design: Owens Corning® (www.owenscorning.com/insulation/commercial) FOAMGLAS® PERINSUL® SIB or equal product from the following:
1. General Plastics (www.generalplastics.com) Last-A-Foam R-9300 Continuous Insulation Blocks.
2. Substitutions: See section 006325.

B. Provide cellular glass structural insulating block for use under first course of masonry veneer. Each insulation block must be labeled with manufacturer's name and product brand name.

C. Performance/Design Criteria:
1. Type V per ASTM C1902 certified by independent third-party testing agency.
2. Compressive Strength: 304 psi, minimum per ASTM D1621.
3. Thermal Resistance (measured per ASTM C518 at mean temperature of 75˚F): R-2.8 per inch of thickness in horizontal direction and R-2.4 per inch of thickness in vertical direction, with 100% lifetime limited warranty on thermal resistance.
4. Water Absorption (ASTM C272/C272M): Maximum.0.001 percent by volume.
5. Surface Burning Characteristics (ASTM E84): Flame spread less than 25; smoke developed less than 450, certified by independent third-party testing agency (unfaced).

D. Materials:
1. Faced on top and bottom for installation into mortar bed.
2. Contains no HCFCs or HFC 134a blowing agents.
3. Recycled Content: Minimum 20%, certified by independent third party.
4. Size: 2.25 inches by 3.625 inches (Standard) **t**hick by 17.70 inches long; square edge.

2.04 MINERAL WOOL INSULATION MATERIALS

A. Where fiberboard insulation is indicated, either rock, slag, or glass mineral fiberboard insulation may be used, at Contractor's option.

B. Applications (when applicable):
1. Curtainwall spandrels, between or over framing members.
2. Fire-rated seal between curtainwall spandrel panels and floor slabs.
3. Flame and smoke barriers, in openings that penetrate fire-rated assemblies.
4. Fire-rated wall assemblies.
5. Shaftwall insulation.
6. Sound attenuation fire batts.
7. Fire safing.

C. Mineral Wool Acoustical Insulation, complying with ASTM C665, Type I.
1. Product: Johns Manville; MinWool Sound Attenuation Fire Batts, unfaced.

a. Provide mineral wool sound attenuation fire batt insulation for interior partitions, exterior walls, or above ceilings as indicated in drawings.

D. Mineral Fiberboard Insulation: Rigid or semi-rigid mineral fiber, ASTM C612 or ASTM C553; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
   1. Where indicated, provide foil facing on one side; with flame spread index of 25 or less, when tested in accordance with ASTM E84.
   2. Where indicated, provide fiberglass reinforced polypropylene facing on one side; with flame spread index of 25 or less, when tested in accordance with ASTM E84.
   3. Flame Spread Index: 5 or less, when tested in accordance with ASTM E84.
   4. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
   5. Board Size: 16 by 48 inches.
   6. Board Thickness: 1 inch.
   7. Combustion Characteristics: Passes ASTM E136.
   8. Sound Transmission Class: STC As indicated on drawings
   9. Products:
      a. ROCKWOOL (ROXUL, Inc): www.rockwool.com/#sle.
      b. Specialty Products & Insulation (SPI): www.spi-co.com/#sle.
      c. Thermafiber, Inc: www.thermafiber.com/#sle.
      d. Substitutions: See section 006325.

DI. Safing Insulation:
   1. Product: Johns Manville; MinWool Safing
      a. Material: Inorganic fibers derived from basalt, with thermosetting resin binder, with high fiber density and low shot content.
         1) Unfaced Type: 4 inches (100 mm) thick, 24 inches (610 mm) wide, 48 inches (219 mm) in length.
         2) Faced Type: 4 inches (100 mm) thick, 24 inches (610 mm) wide, 48 inches (219 mm) in length, with FSP scrim-reinforced foil-facing vapor retarder on one face.
      b. Installation Accessories: Manufacturer’s standard types.
      c. Insulation Thickness: Full depth of cavity
   2. Performance:
      a. Flame Spread Index: Unfaced - 5 or less / Faced - 25 or less when tested in accordance with ASTM E84.
      b. Smoke Developed Index: Unfaced - 0 (zero) / Faced - 5 or less when tested in accordance with ASTM E84.
   3. Other Approved Manufacturers:
      a. Knauf Insulation: www.knaufinsulation.com/#sle.
      b. ROCKWOOL (ROXUL, Inc): www.rockwool.com/#sle.
      c. Thermafiber, Inc: www.thermafiber.com/#sle.
      d. Substitutions: See section 006325.

2.05 BATT (BLANKET) INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used at the Contractor's option.

B. Glass Fiber Sound Attenuation Batt (SAB) Insulation:
   1. Application/s:
      a. Inside stud cavities of **all** metal-framed interior wall construction, unless indicated otherwise; faced or unfaced.
   2. Comply with ASTM C665; friction fit; unfaced.
   3. Flame Spread Index (ASTM E84):
      a. Unfaced: 10 or less.
      b. Foil-faced, one side: 75 or less.
   4. Smoke Developed Index: 10 or less, when tested in accordance with ASTM E84.

5. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
6. Fire-Resistance (if applicable): When installed in wall systems and tested per ASTM E119, assembly fire-resistance ratings of up to 2 hours can be achieved.
    a. 1-Hour: UL Design Nos. U494, U465, and W409.
    b. 2-Hour: UL Design No. U403.
7. Thermal Resistance: R-Value: R-11.
8. Insulation Thickness: 3-1/2 inches.
9. Sound Transmission Coefficient (STC):
    a. Single layer 5/8 inch Type “X” gypsum, each side; 6-inch SS, 5-1/2 inch thick SAB's: STC 51.
    b. Single layer 5/8 inch Type “X” gypsum, each side; 3-5/8 inch SS, 3-1/2 inch thick SAB's: STC 50.
    c. Single layer 5/8 inch Type “X” gypsum, each side; 2-1/2 inch SS, 2-1/2 inch thick SAB's: STC 47.
    d. Single layer 5/8 inch Type “X” gypsum, one side only; double layer other side; 2-1/2 inch SS, 3-1/2 inch thick SAB's: STC 52.
10. Basis of Design Product: Owens Corning; EcoTouch® Unfaced Sound Attenuation Batts (SABs), unfaced, or equivalent from:
    a. CertainTeed Corporation: www.certainteed.com/#sle.
    b. Johns Manville: www.jm.com/#sle.
    c. Knauf Insulation.
    d. Substitutions: See section 006325.

C. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
1. Application/s:
    a. Inside stud cavities of **all** metal-framed exterior wall construction, unless indicated otherwise; Faced or unfaced.
2. Flame Spread Index (ASTM E84):
    a. Unfaced: 75 or less.
    b. Foil-faced, one side: 75 or less.
3. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
4. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
5. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
6. Formaldehyde Content: Zero.
7. Thermal Resistance: R-Value: R-13.
8. Thickness: 3-1/2 inches
9. Products:
    a. Basis of Design: Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation, or equivalent from:
        1) CertainTeed Corporation: www.certainteed.com/#sle.
        2) Johns Manville: www.jm.com/#sle.
        3) Knauf Insulation.
        4) Substitutions: See section 006325.

CI. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced.
1. Flame Spread Index: 0 (zero), when tested in accordance with ASTM E84.
2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
3. Provide foil facing on one side, at locations indicated on drawings.
4. Thermal Resistance: R-Value: R-13.
5. Thickness: 3-1/2 inches.
6. Products:

a. Basis of Design: Johns Manville; MinWool Sound Attenuation Fire Batts, or equivalent by:
    1) Knauf Insulation: www.knaufinsulation.com/#sle.
    2) ROCKWOOL (ROXUL, Inc): www.rockwool.com/#sle.
    3) Thermafiber, Inc: www.thermafiber.com/#sle.
    4) Substitutions: See section 006325.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 INSTALLATION OF BOARD INSULATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.
    1. Butt edges and ends tightly to adjacent boards and to protrusions.

B. Extend boards over expansion joints, unbonded to foundation on one side of joint.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 INSTALLATION OF CELLULAR GLASS STRUCTURAL INSULATING BLOCK

A. Verify manufacturer recommended cure time for air and water barrier system and waterproofing before installing structural insulating block.

B. Install a single layer of cellular glass structural insulating block with facers on top and bottom surfaces fully embedded into mortar set on brick ledge in accordance with manufacturers' written recommendations.

C. Install cellular glass structural insulating block maximum sizes to minimize joints.

D. Locate joints square to framing members. Do not cantilever cellular glass structural insulating block.

E. Butt joints of cellular glass structural insulating block with no gaps or mortar between joints.

F. Insulation board edges shall be butted together tightly and fit around openings and penetrations. Install square edges to fit square and tight.

G. Extend insulation in single course to cover entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Do not drill.

H. Install masonry veneer immediately.

3.04 INSTALLATION OF CONTINUOUS INSULATION BOARD (EXTERIOR WALLS)

A. Install rigid insulation directly to exterior grade sheathing at 16 inches on-center with manufacturer-recommended mechanical fasteners, and tape joints with manufacturer's minimum 4 inches wide sealant tape; comply with ASTM E2357.

B. Install boards horizontally on walls.
    1. Install in running bond pattern.
    2. Butt edges and ends tightly to adjacent boards and protrusions.

C. Extend boards over expansion joints, unbonded to wall on one side of joint.

D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 INSTALLATION OF BOARD INSULATION UNDER CONCRETE SLABS-ON-GRADE

A. Place insulation under slabs on grade after base for slab has been compacted.

B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

C. Prevent insulation from being displaced or damaged while placing slab.

3.06 INSTALLATION OF BATT (BLANKET) INSULATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior and interior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit the insulation tightly in cavities, and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member

F. Tape seal tears or cuts in vapor retarder.

G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.07 FIELD QUALITY CONTROL

A. See Section 013300 for additional requirements.

B. Coordination of Air Barrier Association of America (ABAA) Tests and Inspections:
   1. Provide testing and inspection required by ABAA Quality Assurance Program (QAP).
   2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

3.08 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 07 21 00

SECTION 07 21 60
STRUCTURAL THERMAL BREAK FOR MASONRY VENEER WALLS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Provide labor, materials, tools and equipment necessary to complete the Work of this Section including, but not limited to, the following:
   1. Extruded Polystyrene continuous insulation for cavity wall application.
   2. Cellular glass structural insulating block, secured in mortar to prevent thermal bridging between below grade and above grade continuous insulation.
   3. Fasteners and Hardware or other method as recommended by continuous insulation manufacturer.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-In-Place Concrete

B. Section 07 21 00 - Thermal Insulation

1.03 REFERENCES

A. American Society for Testing of Materials (ASTM)
   1. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of Heat Flow Meter Apparatus.
   2. ASTM C578: Standard Specification for Rigid Cellular Polystyrene Thermal Insulation.
   3. ASTM C1902: Standard Specification for Cellular Glass Insulation Used in Building and Roof Applications.
   4. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
   5. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
   6. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Fire Protection Association (NFPA)
   1. NFPA 285: Standard Fire Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination
   1. Coordinate installation of masonry veneer, masonry ties, insulation, firestopping, and accessories with air barrier membrane, roofing, fenestration, and other moisture protection work.

B. Preinstallation Meeting: Convene a meeting of involved sub-contractors a minimum of two weeks prior to commencing Work described in this Section.

1.05 SUBMITTALS

A. Product Data: Manufacturers' data on each type of product furnished including:
   1. Preparation instructions and recommendations.
   2. Technical data and tested physical and performance properties of products.
   3. Storage, handling requirements, and recommendations.

B. Shop Drawings:
   1. Show locations and extent of cladding attachment and cladding. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, flashing transition assemblies, and tie-ins with adjoining construction.
   2. Include details of interfaces with other materials that form part of building enclosure.

C. Samples: Submit product minimum two samples of the following:
   1. Extruded Polystyrene Insulation minimum three inches by three inches.
   2. Cellular Glass Structural Insulating Block, minimum three inches by three inches.
   3. Any fasteners, hardware, and adhesives recommended by manufacturer.

D. Certificates: Submit documentation signed by Manufacturer that products meet Quality Assurance Certification requirements of this Section.

E. Test And Evaluation Reports:
   1. NFPA 285: Provide documentation from qualified testing agency or fire engineer that the cladding, cladding attachment, insulation, and air barrier system as components of the designed wall assembly have been tested and passed NFPA 285 or approved by third-party engineering judgement.
   2. ASTM E119: Provide documentation from qualified testing agency or fire engineer that the cladding, cladding attachment, insulation, and air barrier system as components of the designed wall assembly have been tested and passed ASTM E119 or approved by third-party engineering judgement.
   3. Engineering analysis: provide engineering analysis by cladding attachment manufacturer for cladding and building conditions using specified insulation, fasteners, cladding, and attachment accessories.

F. Manufacturer's Instructions: Provide Manufacturer's installation instructions for each product specified in this Section.

G. Sustainable Design Submittals: Submit material health and recycled content of each product specified as required in Quality Assurance Sustainability Standards Certification of this Section.

H. Qualification Statements: Provide documentation of required Quality Assurance Qualifications for Manufacturers and Installers for all products in wall assembly as required in this Section.

I. Warranty Documentation: Submit sample warranties as required by this Section.

1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Manufacturers: Insulation systems shall be manufactured and marketed by a firm with a minimum of 20 years' experience in the production and sales of insulation materials. Obtain continuous insulation materials through one source from a single manufacturer. Manufacturers proposed for use, but not named in these specifications shall submit evidence of ability to meet all requirements specified and include a list of projects of similar design and complexity completed within the past 5 years.
   2. Installers: The installation work of this section shall be performed by one entity, an experienced contractor that employs installers and supervisors who are trained and authorized by manufacturer, with a minimum two years' record of successful installations on projects of similar scope.

B. Certifications:
   1. Provide Manufacturer's written certification that cladding attachment system components are compatible.
   2. Provide Manufacturer's written certification that assembly components are compatible with all adjacent materials that come into contact during construction and throughout the life of the building.
   3. Provide Manufacturer's written certification that products are for the intended purpose as described in this Section.

C. Sustainability Standards Certifications: Minimum recycled content Certified by independent third-party testing.

D. Mock-ups:

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in Manufacturer's unopened packaging until ready for installation.

B. Store and protect products in accordance with manufacturer's instructions. Store in a dry area and protect from water, direct sunlight, flame, and ignition sources.

C. Remove and replace materials that are damaged.

D. In the event the extruded polystyrene insulation board becomes wet, wipe dry prior to installation.

E. In the event the batt or blanket insulation becomes wet, remove it from the jobsite.

1.08 FIELD CONDITIONS

A. Apply products within the range of ambient and substrate temperatures recommended by manufacturer.

B. Protect substrates from environmental conditions that affect insulation performance.

1.09 WARRANTY

A. Provide Manufacturer's standard limited warranty against manufacturing defects.

PART 2 – PRODUCTS

2.01 CELLULAR GLASS STRUCTURAL INSULATING BLOCK

A. Basis-of-Design: Owens Corning® (www.owenscorning.com/insulation/commercial) FOAMGLAS® PERINSUL® SIB, or equal product from Armatherm, General Plastics, or equal.
   1. Description: Provide cellular glass structural insulating block for use under first course of masonry veneer. Each insulation block must be labeled with manufacturer's name and product brand name.

B. Performance/ Design Criteria:
   1. Type V per ASTM C1902 certified by independent third-party testing agency.
   2. Compressive Strength: 304 psi, minimum per ASTM D1621.
   3. Thermal Resistance (measured per ASTM C518 at mean temperature of 75˚F): R-2.8 per inch of thickness in horizontal direction and R-2.4 per inch of thickness in vertical direction.
   4. Water Absorption (ASTM C272/C272M): Maximum.0.001 percent by volume.
   5. Surface Burning Characteristics (ASTM E84 : Flame spread less than 25; smoke developed less than 450, certified by independent third-party testing agency (unfaced).

C. Materials:
   1. Faced on top and bottom for installation into mortar bed.
   2. Contains no HCFCs or HFC 134a blowing agents.
   3. Recycled Content: Minimum 20%, certified by independent third party.
   4. Size, Standard: 2.25-inch height by 3.625-inch thickness by 17.7-inch length; square edge.
   5. Size, Jumbo: 2.75-inch height by 3.625-inch thickness by 17.7-inch length; square edge.
   6. Size, Economy: 3.625-inch height by 3.625-inch thickness by 17.7-inch length; square edge.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Verify adjacent materials are dry and ready to receive insulation.

B. Installation of products specified in this Section constitutes acceptance of existing conditions and assumption of responsibility for satisfactory performance.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Cellular Glass Structural Insulating Block:
   1. Verify manufacturer recommended cure time for air and water barrier system and waterproofing before installing structural insulating block.
   2. Install a single layer of cellular glass structural insulating block with facers on top and bottom surfaces fully embedded into mortar set on brick ledge in accordance with manufacturers' written recommendations.
   3. Install cellular glass structural insulating block maximum sizes to minimize joints.
   4. Locate joints square to framing members. Do not cantilever cellular glass structural insulating block.
   5. Butt joints of cellular glass structural insulating block with no gaps or mortar between joints.
   6. Insulation board edges shall be butted together tightly and fit around openings and penetrations. Install square edges to fit square and tight.
   7. Extend insulation in single course to cover entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Do not drill.
   8. Install masonry veneer immediately.

3.04 PROTECTION

A. Protect insulation from damage due to weather and physical abuse until protected by permanent construction.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 07 21 60

SECTION 07 27 00
AIR BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air barriers.

1.02 RELATED REQUIREMENTS

1.03 DEFINITIONS

A. Air Barrier: Airtight barrier made of material that is virtually air impermeable but water vapor permeable, both to amount as specified, with sealed seams and sealed joints to adjacent surfaces.

1.04 REFERENCE STANDARDS

A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2021.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

C. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials; 2022a.

D. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials; 2021a.

E. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies; 2018.

F. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components; 2023.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

1.06 QUALITY ASSURANCE

1.07 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by materials manufacturers before, during, and after installation.

PART 2 PRODUCTS

2.01 AIR BARRIER MATERIALS

A. Air Barrier Sheet, Mechanically Fastened:
   1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
   2. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure A - Desiccant Method, at 73.4 degrees F.
   3. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 90 days of weather exposure.
   4. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, Class A, when tested in accordance with ASTM E84.
   5. Seam and Perimeter Tape: Polyethylene self-adhering type, mesh reinforced, 2-1/2 inches wide, compatible with sheet material; unless otherwise indicated.
   6. Products:
      a. DuPont de Nemours, Inc; Tyvek CommercialWrap D with Tyvek Fluid Applied Flashing - Brush Formulation, Tyvek Fluid Applied Flashing and Joint Compound, FlexWrap NF, StraightFlash, StraightFlash VF, Tyvek Wrap Caps, and Tyvek Tape: building.dupont.com/#sle.
      b. Substitutions: See section 006325.

B. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.
   1. Air Barrier Coating:
      a. Material: Fire-retardant, non-asphalt synthetic polymer composition.
      b. Dry Film Thickness (DFT): 30 mil (0.030 inch), minimum.
      c. Air Permeance: 0.040 cfm/sq ft, maximum, when tested in accordance with ASTM E2357.
      d. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M using Procedure B - Water Method, at 73.4 degrees F.
      e. Ultraviolet (UV) and Weathering Resistance: Approved by manufacturer for up to 60 of weather exposure.
      f. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A when tested in accordance with ASTM E84.
      g. Comply with NFPA 285 requirements for wall assembly.
      h. Nail Sealability: Pass, when tested in accordance with ASTM D1970/D1970M.
      i. VOC Content: Zero.
      j. Sealants, Tapes and Accessories: As recommended by coating manufacturer.
      k. The manufacturer shall warrant the product against material defects or defects in the manufacturing for five (5) years from the Date of Substantial Completion.
      l. Products:
         1) Carlisle Coatings and Waterproofing, Inc; Barritech VP: www.carlisleccw.com/#sle.
         2) Dow Chemical Company; DOWSIL DefendAir 200C: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
         3) DuPont de Nemours, Inc; Tyvek Fluid Applied WB+ with Tyvek Fluid Applied Flashing and Joint Compound, Sealant for Tyvek Fluid Applied System, and StraightFlash: building.dupont.com/#sle.
         4) Henry Company; Air-Bloc 33: www.henry.com/#sle.
         5) Rubber Polymer Company; Rub-R-Wall Airtight VP (Vapor Permeable) Air/Moisture Barrier: www.rpcinfo.com/#sle.
         6) W.R. Meadows, Inc; Air-Shield LMP: www.wrmeadows.com/#sle.
         7) Substitutions: See section 006325.

2.02 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Adjacent Substrates: As indicated or in compliance with air barrier manufacturer's installation instructions.

B. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrate and air barrier materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready for work of this section.

B. Do not proceed with this work until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive adhesives and sealants in accordance with manufacturer's installation instructions.

C. Fill cracks, gaps and joints with fill compound, detail sealant or other material approved by air barrier manufacturer.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's installation instructions.

1. Apply product by spray, roller, brush or other method as recommended by air barrier manufacturer. Apply product at specified wet mil thickness in accordance with air barrier manufacturer’s requirements.

B. Air Barriers: Install continuous airtight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

C. Apply sealants and adhesives within recommended temperature range in accordance with manufacturer's installation instructions.

D. Mechanically Fastened Sheets - On Exterior:
   1. Install sheets shingle fashion to shed water, with seams generally horizontal.
   2. Overlap seams as recommended by manufacturer, 6 inches, minimum.
   3. Overlap at outside and inside corners as recommended by manufacturer, 12 inches, minimum.
   4. For applications indicated to be airtight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners as recommended by manufacturer.
   5. Install air barrier underneath jamb flashings.
   6. At framed openings with frames having nailing flanges, extend sheet into opening and over flanges; at head of opening, seal sheet over flange and flashing.

E. Fluid-Applied Coatings or Membranes:
   1. Prepare substrate in accordance with manufacturer's installation instructions; treat joints in substrate and between dissimilar materials as indicated.
   2. Use flashing to seal to adjacent construction and to bridge joints in coating substrate.

F. Openings and Penetrations in Exterior Air Barriers:
   1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto air barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
   2. At openings with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
   3. At openings with nonflanged frames, seal air barrier to each side of framing at opening using flashing at least 9 inches wide, and covering entire depth of framing.
   4. At head of openings, install flashing under air barrier extending at least 2 inches beyond face of jambs; seal air barrier to flashing.
   5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
   6. Service and Other Penetrations: Form flashing around penetrating item and seal to air barrier surface.

G. Verify compliance with air barrier manufacturer’s minimum required thickness by documenting product use per area. Perform and document wet mil thickness measurements every 100 square feet, or more frequently if required, to establish uniform and adequate coverage.

H. Product and accessories shall be fully-adhered to substrates. Defects such as holes, fishmouths, blistering, de-lamination, bridging or thin spots shall be repaired according to air barrier manufacturer’s instructions.

3.04 FIELD QUALITY CONTROL

A. Manufacturers Field Services and Reports:
   1. The air barrier manufacturer shall provide qualified staff personnel to make field visits to the Project Site to observe site conditions, condition of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
      a. A minimum of two (2) field visits are required.
   2. Individuals are to report observations and on-site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

a. Submit report within (10) days of observation to Contractor and Architect.

B. Coordination of ABAA Tests and Inspections:
   1. Provide testing and inspection required by ABAA QAP.
   2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
   3. Cooperate with ABAA testing agency.
   4. Allow access to air barrier work areas and staging.
   5. Do not cover air barrier work until tested, inspected, and accepted.

C. Do not cover installed air barriers until required inspections have been completed.

D. Take digital photographs of each portion of installation prior to covering up air barriers.

3.05 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 27 00

SECTION 07 41 13.16
STANDING-SEAM METAL ROOF PANELS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Architectural roofing system of pre-formed standing-seam metal roof panels.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 21 00 - Thermal Insulation

C. Section 076200 - Sheet Metal Flashing and Trim

D. Section 07 92 00 - Joint Sealants

1.04 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM A755/A755M - Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products; 2018.

D. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.

E. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

F. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

G. IAS AC472 - Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems; 2018.

H. ICC (IBC)-2012 - International Building Code; 2012.

I. ICC (IBC)-2018 - International Building Code; 2018.

1.05 PERFORMANCE REQUIREMENTS

A. General Performance: Metal roof panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design roof panel systems, including comprehensive engineering analysis by a qualified professional engineer, using the design criteria specified below.
   1. General Design Criteria:
      a. Building Code: 2018 IBC
      b. Structural Design Standard: See Structural Drawings
      c. Risk Category: See Structural Drawings
   2. Seismic Design Criteria:
      a. Seismic Design Category: Category B
      b. Site Classification: [Global - Soil Class]
   3. Wind-Resistance Design Criteria (exterior doors):
      a. Ultimate Design Wind Speed, V_{ULT}: See Structural Drawings

b. Site Exposure Category: See Structural Drawings
c. Surface Roughness Category: [Global - Surface Roughness]

1.06 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Summary of test results, indicating compliance with specified requirements.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Specimen warranty.

C. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
1. Show work to be field-fabricated or field-assembled.
2. Include structural analysis signed and sealed by qualified structural engineer, indicating compliance of roofing system to specified loading conditions.

D. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.

F. Manufacturer's qualification statement.
1. Provide documentation that indicates manufacturer is accredited under IAS AC472.

G. Test Reports: Indicate compliance of metal roofing system to specified requirements.

H. Specimen Warranty

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
1. Accredited by IAS in accordance with IAS AC472.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on pre-finished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.09 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall roof panel assemblies that fail in materials or workmanship for (2) years from the Date of Substantial Completion.
1. Failures include, but are not limited to, the following:
a. Structural failures include rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

B. Panel Finish Warranty: Provide manufacturer's special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling for twenty years from the Date of Substantial Completion.

C. Waterproofing Warranty: Provide manufacturer's warranty for weather-tightness of standing-seam metal roofing system, including agreement to repair or replace roofing that fails to keep out water, for five years from the Date of Substantial Completion.

D. Installer Warranty: Standard forms in which installer agrees to repair or replace components of metal panel assemblies that fail in workmanship for (2) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Berridge Manufacturing Company.
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer:
      a. MBCI
      b. AEP Span
      c. Centria: www.centria.com/#sle.
      d. Petersen Aluminum Corporation: www.pac-clad.com/#sle.
      e. ATAS International, Inc.: www.atas.com/#sle.
      f. Firestone Building Products LLC
   2. Substitutions: See section 006325.

2.02 STANDING-SEAM METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
   1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514.

B. Basis of Design Product: Berridge; High Seam Tee-Panel System; Vertical-Rib, Batten Seamed Joint, Standing-Seam Metal Roof Panels
   1. Architectural Metal Panels: Factory-formed panels with factory-applied finish.
      a. Metallic-Coated Steel Sheet:
      b. Metallic-Coated Steel Sheet: Aluminum-zinc alloy-coated steel complying with ASTM A792/A792M; minimum AZ50 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
         1) Nominal Thickness: 22 gage (0.0299 inch).
         2) Exterior Finish: Two-coat fluoropolymer
         3) Painted materials shall have a removable plastic film to protect the paint during roll forming, shipping and handling.
         4) Color: As selected by architect from manufacturers full range of colors
      c. Seam Height: 1-1/2 inches.
      d. Panel Exposure: 18-1/4 inches.
      e. Profile: Batten seam, with separate snap-on battens of same metal as panels; concealed fastener system.
      f. Formed with vertical ribs at panel edges and panel striations between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of the panels, aligning vertical ribs and snapping on batten seam cap with vinyl insert.
      g. Texture: Smooth.
      h. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so that each sheet spans over three or more supports.

2.03 UNDERLAYMENT

A. Underlayment: Self-adhering, high-temperature underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 40 mils (1.02 mm) thick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.

1. Basis of Design: #CCW WIP 300HT, Water and Ice Protection, manufactured by Carlisle Coatings and Waterproofing.
2. Substitutions: See section 006325.

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Two-Coat Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch
   1. Color: As selected by Architect fomr manufacturers full range of colors.
   2. Texture: Manufacturer’s standard texture (striated).
   3. Manufacturers:
      a. PPG Metal Coatings; Duranar: www.ppgmetalcoatings.com/#sle.
      b. Sherwin-Williams Company; Fluropon: www.coil.sherwin.com/#sle.
      c. Substitutions: See section 006325.

2.06 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fascia, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fascias, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish or combination steel and closed-cell foam.

E. Panel Fasteners: Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size as approved for the applicable loading requirements.

F. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Joint Sealant: Silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.07 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Not permitted

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
   3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
      a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of pre-formed metal roof panels until substrates have been properly prepared.

3.02 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

B. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

C. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.

D. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

E. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

A. Install roofing system in accordance with approved shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.

B. Underlayment:
   1. Self-Adhering Sheet Underlayment:
      a. At minimum apply over the roof area indicated below:

1) Roof perimeter for a distance up from eaves of 36 inches (914 mm).
2) Valleys, from lowest point to highest point, for a distance on each side of 18 inches (460 mm. Overlap ends of sheets not less than 6 inches (152 mm).
3) Rake edges for a distance of 18 inches (460 mm).
4) Hips and ridges for a distance on each side of 12 inches (305 mm).
5) Roof-to-wall intersections for a distance from wall of 18 inches (460 mm).
6) Around dormers, skylights, and other penetrating elements for a distance from element of 18 inches (460 mm).

2. Felt Underlayment:
   a. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than 6 inches (152.4 mm), in shingle fashion to shed water.

C. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.

D. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. The use of torches for field cutting is absolutely prohibited.

E. Install all components required for a complete roofing assembly, including flashings, trim, closure strips, rib closures, ridge closures, and similar roof accessory items.

F. Roof Panels: Install panels in strict accordance with manufacturer's instructions, minimizing transverse joints except at junction with penetrations.
   1. Incorporate concealed clips at panel joints, and apply snap-on battens to provide weathertight joints.
   2. Provide sealant tape or other approved joint sealer at lapped panel joints.
   3. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.

3.04 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

3.05 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION 07 41 13.16

SECTION 07 46 16
LINEAR METAL SOFFIT AND WALL CLADDING PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum wall and soffit cladding with woodgrain appearance.

B. Trim, flashings, accessories, and fasteners.

1.02 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing

B. Section 07 92 00 - Joint Sealants

1.03 REFERENCE STANDARDS

A. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

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

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

1.04 SUBMITTALS

A. See Section 013300, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Cladding materials, underlayment, flashings, fasteners and accessories.
   3. Dimensions, physical properties, and typical details.
   4. Storage and handling requirements and recommendations.
   5. Installation instructions and recommendations.

C. Shop Drawings: Indicate layout, methods of attachment and support clips, provisions for movement, flashing, trim, edge and field conditions, interface with adjacent materials, locations of cutouts or special shapes, and details.

D. Samples: For each finish product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

G. Executed warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing brand name and manufacturer's identification until ready for installation.

B. Verify quantities and condition immediately upon receipt; remove damaged materials from site, and coordinate with manufacturer to replace with new materials meeting specified requirements.

C. Store products off the ground, within manufacturer's temperature and environmental limits, away from moisture, protected from traffic and construction activities, and minimize on-site storage prior to installation.

1.07 FIELD CONDITIONS

A. Do not install cladding when air temperature or relative humidity are outside manufacturer's limits.

1.08 WARRANTY

A. See Section 013300 for additional warranty requirements.

B. Manufacturer Warranty: The manufacturer shall warrant the installation to be free of defects in material and workmanship for (2) years from the Date of Substantial Completion.

C. Wood Grain Finish Warranty: Provide manufacturer's limited lifetime warranty against cracking, peeling and gloss/color retention for (15) years from the Date of Substantial Completion.

D. Installation Warranty: The installing subcontractor shall warrant the installation to be free of defects in material and workmanship for (1) year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Knotwood: www.knotwood.com
   1. Substitutions: Not permitted.

2.02 LINEAR METAL WALL AND SOFFIT CLADDING

A. Wall Cladding: :
   1. Basis of Design: Knotwood; "Wood Grain Aluminum Wall Cladding"
      a. Material: 6063-T6 aluminum, extruded
      b. Model: KEC150
      c. Size: 6-inches wide by 5/8-inch depth by 18 feet 6 inches length (max.)
      d. Finish: Alluminate bonded film finish with woodgrain appearance.
         1) Color: As selected by Architect from Manufacturers full range of finishes
   2. Factory-formed cladding.
      a. Precoated aluminum sheet, 0.016 inch minimum base metal thickness.
      b. Profile: Board Style, Single 6-Inch; 6 inches wide, solid; 6 inch exposure.

B. Soffit Cladding, Vented: :
   1. Basis of Design: Knotwood; "Wood Grain Aluminum Vented Soffit Cladding"
      a. Material: 6063-T6 aluminum, extruded
      b. Model: KECV150
      c. Size: 6-inches wide by 5/8-inch depth by 18 feet 6 inches length (max.)
      d. Finish: Alluminate bonded film finish with woodgrain appearance.
         1) Color: As selected by Architect from Manufacturers full range of finishes

C. Material: Precoated aluminum sheet, 0.016 inch, minimum base metal thickness.
   1. Profile: Board Style, Single 6-Inch; 6 inches wide, center panel vented; 6 inch exposure.
   2. Ventilation: Provide INSERT VALUE sq inches per sq ft of net free area.
   3. Soffit Accessories: Provide coordinating accessories made of same material as required for complete and proper installation.
      a. F-Channel trim.
      b. J-Channel trim.
      c. Fascia corner.

D. Aluminum Trim: :
   1. Basis of Design: Knotwood; "Wood Grain Aluminum Trim"
      a. Material: 6063-T6 aluminum, extruded
      b. Finish: Alluminate bonded film finish with woodgrain appearance.
         1) Color: White Ash
   2. Accessories: Provide coordinating accessories made of same material as required for complete and proper installation.
      a. KEDSTRADJ - Starter Piece for Cladding and Decking 18’6”

b. KECFBF- Cladding Flashing Base (used with KWCFTTLM)
c. KECFTTLM - Cladding Top Clip
d. KECJBF - Cladding Bottom Joiner (used with KWCTJ)
e. KECTJM - Cladding Top Joiner
f. KECIECF - Cladding Internal/External Female Corner
g. KECIECM - Cladding Internal/External Male Corner

2.03 FINISHES

A. Finish: Knotwood; "Premium Wood Finishes"; Uses a polyurethane powder coat with ink based wood grain patterns sublimated into the base powder effectively tattooing the powder. The combined effect creates all the aesthetic aspects of real wood in a powder coated finish.
   1. Wood Grained (AkzoNobel STF D2010 Series)
      a. Color: White Ash

2.04 FABRICATION

A. Prepare surfaces, pre-treat and coat components in accordance with AAMA 2604 and 2605 Quality Standards and applicable European standards for the coating material specified.

B. Wrap and package coated components using methods suitable for transit and covered site storage without damage.

2.05 MATERIALS

A. Precoated Aluminum Sheet: ASTM B209 (ASTM B209M), 3105 alloy, O temper, smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating, and with manufacturer's standard panel back coating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrate conditions before beginning installation.

B. Verify dimensions and acceptable substrate condition.

C. Do not proceed with installation until unacceptable conditions have been corrected.

3.02 PREPARATION

A. Surface Preparation: Prepare surfaces as recommended by manufacturer.

B. Protect surrounding areas and adjacent surfaces during execution of this work.

3.03 INSTALLATION

A. Install aluminum wall cladding, soffit cladding, and trim in accordance with manufacturer's written instructions.

B. Attach cladding using manufacturers recommended fasteners, sealants, and adhesives, allowing for thermal expansion.

C. Exterior Soffit Vents: Install according to manufacturer's written instructions; provide vent area specified.

D. Horizontal Clapboard: Work from base of installation to top; stagger lap joints in horizontal cladding in uniform pattern as successive courses of cladding are installed.

E. Install joint sealants to ensure watertight conditions; see Section 07 92 00.

F. Where dissimilar materials are in contact, prevent galvanic action as recommended by manufacturer.

3.04 CLEANING

A. Remove grease and oil films, excess joint sealer, handling marks, and other installation debris from aluminum surfaces, leaving surfaces clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to material finishes.

B. Upon completion of installation, thoroughly clean prefinished aluminum surfaces in accordance with AAMA 609 & 610.

3.05 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 07 46 16

SECTION 07 46 46
FIBER-CEMENT SIDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fiber-cement siding.

1.02 REFERENCE STANDARDS

A. AAMA 509 - Voluntary Test and Classification Method for Drained and Back Ventilated Rainscreen Wall Cladding Systems; 2022.

B. ASTM C1186 - Standard Specification for Flat Fiber-Cement Sheets; 2022.

C. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.03 SUBMITTALS

A. Product Data: Characteristics and storage and handling requirements.

B. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, support rails, and anchorage methods.

C. Samples: Two of each siding panel, 12 by 12 inches, illustrating color, pattern, and texture.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of type specified, with minimum 3 years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store materials in manufacturer's unopened packaging with labels intact.

B. Store materials under dry and waterproof cover, in ventilated area, and elevated above grade on flat surface.

1.06 FIELD CONDITIONS

A. Do not install panels when air temperature or relative humidity are outside manufacturer's limits.

1.07 WARRANTY

A. Manufacturer Warranty: Provide 15-year manufacturer warranty for siding panels. Complete forms in Owner's name and register with manufacturer.

B. Finish Warranty: Provide 15-year manufacturer warranty against excessive finish degradation. Include provision for replacing units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nichiha USA, Inc: www.nichiha.com/#sle.

B. Allura. a division of Plycem USA, Inc.

C. James Hardie Building Products, Inc.

2.02 FIBER-CEMENT SIDING

A. Description: Factory-fabricated, drained and back-ventilated (D/BV) rainscreen siding system, site assembled; comply with AAMA 509.

B. Performance Requirements:
   1. Siding Density: Comply with ASTM C1186, Type A, Grade II.
   2. Structural Performance:

a. Comply with ASTM E330/E330M, using test pressure 1.5 times design wind pressure, with 10-second maximum load duration.
b. Maximum Allowable Deflection of Panel: L/180 for length (L) of span.

C. Masonry Series Siding: Sandstone block texture with 1/4-inch wide vertical score line at panel midpoint.
1. Size: 17-7/8 by 71-9/16 inches. See elevations for Panel Joint layout and include enough material for the associated waste.
2. Thickness: 3/4 inch.
3. Corners: Premanufactured with 3-1/2-inch returns; match panel finish.
4. Orientation: Horizontal.
5. Finish: Gentle Gray.
6. Products: Nichiha USA, Inc; Sandstone.

2.03 COMPONENTS

A. Thermal Clip and Rail:
1. Thermal Clips: JEL 778, zinc-aluminum-magnesium alloy-coated steel.
2. Corner Clips: JE 777C, zinc-aluminum-magnesium alloy-coated steel.
3. Corrugated Spacer: FS 1010.

2.04 ACCESSORIES

A. Trim: Aluminum.
1. Profiles: Provide H-mold, inside corner, and open outside corner trim.
2. Finish: Match panels.

B. Furring Strips: Galvanized metal channels.

C. Flashing: Manufacturer's recommended material.
1. Starter Profiles: Main segments, inside corners, and outside corners.
2. Overhang Profiles: Main segments, inside corners, outside corners, and joint clips.
3. Finish: Matte black.

D. Fasteners: Galvanized or corrosion resistant; length as required to penetrate fastened surface, minimum 1-1/4 inches.

E. Sealants: As recommended by manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect surrounding areas and adjacent surfaces from damage during execution of work.

3.02 INSTALLATION

A. Install siding and support structure in accordance with manufacturer's instructions.

B. Install flashing in accordance with manufacturer's instructions.

3.03 TOLERANCES

A. Wall Surface Plane: Level within 1/4 inch in 20 feet.

3.04 REPAIR

A. Touch up, repair, or replace damaged products before substantial completion.

3.05 CLEANING

A. Clean siding in accordance with manufacturer’s instructions.

3.06 PROTECTION

A. Protect installed siding from subsequent construction operations.

SECTION 07 54 23
THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fully-Adhered Single-Ply (TPO) Roof System, including roof membrane, cover board, roof insulation, air/vapor barrier, flashing, and accessories over a structural concrete roof deck (by others).

1.02 REFERENCE STANDARDS

A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2017.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2022a.

C. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers; 2015.

D. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer; 2016 (Reapproved 2022).

E. ASTM D4263 - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method; 1983 (Reapproved 2018).

F. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing; 2021.

G. NRCA (RM) - The NRCA Roofing Manual; 2022.

H. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other construction defects. Membrane roofing and base flashings shall remain watertight.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturers based on testing and field experience.

C. Delegated Design: Design the single-ply roofing system, including comprehensive engineering analysis by a qualified professional engineer registered in the State of Missouri, using the design criteria specified below.

D. Design Criteria:
   1. Building Code: 2018 IBC
   2. Design Wind Pressures: Comply with See Structural Drawings
   3. Risk Category: See Structural Drawings
   4. Design Wind Speed: See Structural Drawings
   5. Site Class: [Global - Soil Class]
   6. Site Exposure: See Structural Drawings
   7. Seismic Category: Category B
   8. External Fire Resistance Classification: Class A, when tested per UL 790.

E. Thermal Performance:
   1. Applicable Energy Code: [Global - Energy Code]
   2. Climate Zone: [Global - Climate Zone]
   3. Insulation Component Requirements: :
      a. Roof (Insulation entirely above roof deck): R-30ci / U-0.032

b. Walls, Above Grade, Metal-Framed: R-13 + R-7.5 ci / U-0.064
c. Walls, Below Grade: R-7.5ci / C-0.119
d. Slab-on-Grade Floors, Unheated: R-10 for 24-inches below / F-0.54
e. Opaque Doors, Non-Swinging: R-4.75

F. The TPO membrane meets the ENERGY STAR requirement for reflectance and emittance:
1. When tested in accordance with ASTM C1549, the White material shall have an initial solar reflectance of 0.79, and a 3-year aged reflectance of 0.70.
2. When tested in accordance with ASTM C1371; the White material shall have an initial emittance of 0.90 and a 3-year aged emittance of 0.86.

G. Drainage: Provide a roof system with positive drainage where all standing water dissipates within 48 hours after precipitation ends.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Provide manufacturer's written information listed below.
1. Product data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
2. Preparation instructions and recommendations.
3. Storage and handling requirements.

C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, and setting plan for tapered insulation.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

E. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions given.

F. Manufacturer's Installation Instructions: Indicate membrane seaming precautions and perimeter conditions requiring special attention.

G. Specimen Warranty: For approval.

H. Warranty:
1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
2. Submit installer's certification that installation complies with all warranty conditions for the waterproof membrane.

I. Manufacturer's Qualification Statement.

J. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum twenty (20) years of documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section:
1. Approved by membrane manufacturer.

C. After completion of the installation, upon request, an inspection shall be conducted by a Field Service Representative (FSR) of the Manufacturer to ascertain that the membrane roofing system has been installed according to the specifications and details applicable at the time of the bid. This inspection is to determine whether a warranty shall be issued. It is not intended as a final inspection for the benefit of the owner.

D. Preconstruction Roofing Conference: Before starting the Work of this Section, conduct a conference at the Project site.
1. Meet with the Owner, Architect, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, and contractors whose work interfaces with or affects roofing, including roof accessories and roof-mounted equipment.

2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review requirements for deck substrate conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of the roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and the condition of other construction that will affect the roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.

B. Protect products in weather protected environment, clear of ground and moisture.

C. Protect foam insulation from direct exposure to sunlight.

D. Provide Safety Data Sheets (SDS) at the project site at all times during transportation, storage, and installation of materials.

E. Comply with requirements to prevent overloading or disturbance of the structure when loading materials onto the roof.

1.07 WORK SEQUENCE

A. Schedule and execute work to prevent leaks and excessive traffic on completed roof sections. Care should be exercised to provide protection for the interior of the building and to ensure water does not flow beneath any completed sections of the membrane system.

1.08 FIELD CONDITIONS

A. Do not apply roofing membrane during unsuitable weather. Refer to manufacturer's written instructions.

B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

D. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.

E. Do not allow grease, oil, fats, or other contaminants to come into direct contact with membrane.

1.09 SAFETY

A. The roofing contractor shall be responsible for all means and methods as they relate to safety and shall comply with all applicable local, state, and federal requirements that are safety-related.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer's standard NDL roof warranty, in which the manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship for twenty (20) years from the Date of Substantial Completion.
   1. The roof system warranty includes the membrane, flashings, adhesives and sealants, insulation, insulation adhesives, cover board, fasteners, fastener plates, fastening bars, edge metal, and any other products utilized in the installation.
   2. Wind Damage Coverage: Winds of 3-second peak gust speeds up to 90 mph, measured at 10 meters above ground, and using available meteorological data.

3. Hail Damage Coverage: None
4. Puncture Coverage: None

B. Special Extended Warranty: Sheet Metal Paint Finish: The manufacturer shall warrant the sheet metal paint finishes showing evidence of deterioration of factory-applied finishes for fifteen (15) years from the Date of Substantial Completion.

C. Installation Warranty: The installing subcontractor shall warrant the roof system installation to be free of defects in material and workmanship for two (2) years from the Date of Substantial Completion.

1.11 WARRANTY

A. See Section 013300 for additional warranty requirements.

B. Roof System Warranty: Provide manufacturer's standard NDL system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes for 20 years from the Date of Substantial Completion.
1. The roof system warranty includes the membrane, flashings, adhesives and sealants, insulation, insulation adhesives, cover board, fasteners, fastener plates, fastening bars, edge metal, and any other products utilized in the installation.
2. Wind Damage Coverage: Include winds (3-second peak gust) speeds up to 90 mph, measured at 10 meters above ground, and verified with available meteorological data.
3. For repair and replacement include costs of both material and labor in warranty.
4. Puncture Coverage: None
5. Hail Damage Coverage: None

C. Installation Warranty: The Roofing Contractor shall warrant the installation to be free of defects in material and workmanship for two (2) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Carlisle Syntec Systems (www.carlislesyntec.com/#sle), or equivalent products by the following manufacturers:
1. Firestone Building Products Company.
2. GAF Materials Corporation.
3. GenFlex Roofing Systems.
4. Johns Manville.

B. Substitutions: See section 006325.

2.02 ROOFING APPLICATIONS

A. Scope: Single-ply membrane roof system, fully adhered, over a structural concrete roof deck (by others)

B. Roofing Assembly Design and Performance Requirements: Refer to Heading 1.03.

2.03 ROOFING MEMBRANE AND ASSOCIATED MATERIALS

A. Vapor Barrier/Base Sheet: Self-adhering, rubberized asphalt membrane laminated to spun-bonded polyester fabric; 40 mil, 0.040 inch thick, minimum.
1. Product: Carlisle; VapAir Seal 725TR Air/Vapor Barrier.
2. Application: Installed over a structural concrete roof deck (by others).

B. Roof Membrane:
1. Material: Thermoplastic Polyolefin (TPO) complying with ASTM D6878/D6878M.
2. Reinforcing: Internal fabric.
3. Thickness: 60 mil (0.060 inch), minimum.
4. Sheet Width: Factory fabricated into largest sheets possible.
5. Color: White.
6. Installation Method: Adhered.
7. Basis of Design: Carlisle; Sure-Weld Fully-Adhered TPO Roofing System

C. Seaming Materials: As recommended by membrane manufacturer.

D. Flexible Flashing Material: Same material as membrane.

E. Base Flashing: Provide waterproof, fully adhered base flashing system at all penetrations, plane transitions, and terminations.

F. Cover Board:
   1. Cover Board: Glass mat-faced gypsum panels, ASTM C1177/C1177M, fire resistant type, 5/8 inch thick.
      a. Basis of Design Product:
         1) G-P; Dens-Deck Prime Roof Board, as distributed by Carlisle.

G. Roof Insulation:
   1. Polyisocyanurate (ISO) Board Insulation, Tapered Panel:
      a. ASTM C1289, Type II, Class 1, fiber reinforced felt on both faces; Grade 2.
      b. Application/s:
         1) Roof insulation over level roof framing systems (flat roofs)
         2) Roof insulation for pre-formed saddles, crickets, tapered edge strips, and other insulation shapes as required to direct water to roof drains, gutters, or thru-wall scuppers.
      c. Factory Tapered Board: Slope 1/4-inch per foot, minimum.
      d. Grade and Compressive Strength: Grade 2, 20 psi, minimum.
      e. Board Thickness: 1/2 inch, minimum.
      f. Panel Size: 48-inches by 48-inches.
      g. Taper panels from the fewest layers possible.
      h. Basis of Design Product: InsulBase Tapered Polyiso Board Insulation.
   2. Polyisocyanurate (ISO) Board Insulation, Flat Panels:
      a. ASTM C1289, Type II, Class 2, coated glass fiber mat on both faces; Grade 2 (20 psi).
      b. Uses:
         1) Roof insulation over sloping roof framing systems. The minimum slope of roof framing shall be 1/4 inch per foot.
         2) Roof insulation over level roof framing systems, as the base for tapered insulation.
      c. Board Thickness / R-Value: Provide multiple-layer configuration of roof insulation, including tapered panels, to achieve an R-Value of R-30 at the location of roof drains.
         1) Exception: At roof drains, the insulation can taper down 1-inch within the area of the drain sump (i.e. 4 feet away from the drain on a 1/4-inch per foot system)
      d. Grade and Compressive Strength: Grade 2, 20 psi, minimum.
      e. Panel Size: Per manufacturer.
      f. Basis of Design Product: Carlisle; SecurShield.

2.04 ACCESSORIES

2.05 ACCESSORIES

A. Prefabricated Roofing Expansion Joint Flashing: Sheet butyl over closed-cell foam backing seamed to galvanized steel flanges.

B. Flashing:
   1. Flashing Membrane:
      a. Carlisle Sure-Weld TPO Flashing, 60-mils thick.
   2. Prefabricated Flashing Accessories:
      a. Pre-Molded Corners and Seams: Same material as membrane, in manufacturer's standard thicknesses.
         1) Carlisle Sure-Weld TPO Inside Corners; 60 mil, 0.060 inch thick.
         2) Carlisle Sure-Weld TPO Outside Corners; 60 mil, 0.060 inch thick.

3) Carlisle Sure-Weld TPO T-Joint Covers; 60 mil, 0.060 inch thick, 4-1/2 inch diameter.
4) Carlisle TPO Curb Wrap Corners; 45 mil, 0.045 inch thick, 6 inch wide flange and 12 inch overall height.

b. Roof Penetration Flashings: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
1) Carlisle SynTec Systems; Sure-Weld TPO Molded Pipe Flashings; for pipes 1 inch to 6 inches in diameter.
2) Carlisle SynTec Systems; Sure-Weld TPO Split Pipe Seals; for pipes 1 inch to 6 inches in diameter.
3) Carlisle SynTec Systems; Sure-Weld TPO Square Tubing Wraps. 3 inches, 4 inches, and 6 inches square.

c. Sealant Pockets: Same material as membrane, with manufacturer's standard accessories, in manufacturer's standard configuration.
1) Carlisle SynTec Systems; Sure-Weld TPO Molded Sealant Pockets: Two piece, interlocking, flexible pockets with rigid polypropylene vertical wall and preformed deck flanges. 6 inches wide and adjustable from 7-1/2 inches to 12 inches long.
2) Carlisle SynTec Systems; Sure-Weld TPO Prefabricated Sealant Pockets: Two piece, prefabricated, rigid; TPO and TPO-coated metal with weldable horizontal deck flange; 12 inch square.
3) Carlisle Sure-Weld TPO Sealant Pockets Extension Legs: 45 mil, 0.045 inch thick TPO membrane and TPO-coated metal; each unit extends length of Molded Sealant Pocket or Prefabricated Sealant Pocket by 10 inches. Use full length or cut to size.

C. Insulation Adhesive: Two-component polyurethane, expanding foam.
1. Basis of Design: Carlisle Flexible FAST.

D. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, compatible with roofing materials; 6 inches wide; self adhering.

E. Membrane Adhesive:
1. Basis of Design: Carlisle; Sure-Weld Bonding Adhesive: Synthetic rubber adhesive used for bonding Sure-Weld membrane to various surfaces.

F. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

G. Strip Reglet Devices: Galvanized steel, maximum possible lengths per location, with attachment flanges.

H. Sealants: As recommended by membrane manufacturer.

I. Cleaner: Manufacturer's standard, clear, solvent-based cleaner.
1. Basis of Design: Carlisle; Weathered Membrane Cleaner.

J. Membrane Primer: Manufacturer's recommended product.
1. Product:
a. Carlisle 702 Primer: Single component, solvent-based, high-tack primer used to provide maximum adhesion between Carlisle Air and Vapor Barrier and an approved substrate.
2. Termination Bar.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and site conditions are ready to receive work.

B. Verify structural concrete roof substrate deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.

C. Verify deck surfaces are dry and free of snow or ice.

D. Verify that roof openings, curbs, and penetrations through roof are solidly set.

3.02 PREPARATION, GENERAL

A. Clean substrate thoroughly prior to roof application.

B. Do not begin work until other work that requires foot or equipment traffic on roof is complete.

C. Apply manufacturer's recommended vapor retarder or temporary roof before roof installation.

3.03 CONCRETE DECK PREPARATION

A. Fill surface honeycomb and variations with latex filler.

B. Confirm dry deck by moisture meter with 12 percent moisture maximum when tested per ASTM D4263.

3.04 INSTALLATION - GENERAL

A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.

B. Do not apply roofing membrane during unsuitable weather.

C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.

D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.05 INSTALLATION - VAPOR BARRIER/BASE SHEET AND INSULATION

A. Apply vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
   1. Extend vapor retarder under cant strips and blocking to deck edge.
   2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.

B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.

C. Attachment of Insulation: Embed each layer of insulation in adhesive in full contact, in accordance with roofing and insulation manufacturers' instructions.

D. Lay subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.

E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

F. Lay boards with edges in moderate contact without forcing, and gap between boards no greater than 1/4 inch. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.

G. Tape joints of insulation in accordance with roofing and insulation manufacturers' instructions.

H. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.

I. Do not apply more insulation than can be completely waterproofed in the same day.

3.06 INSTALLATION - COVER BOARD

A. Coordinate installing membrane roofing system components so the cover board is not exposed to precipitation or left exposed at the end of the workday.

B. Install cover board with long joints of the cover board in a continuous straight line with end joints staggered between rows, abutting edges, and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with a cover board.
   1. Cut and fit cover board within 1/4 inch (6 mm) of nailers, projections, and penetrations.

C. Trim the surface of the cover board where necessary at roof drains so the completed surface is flush and does not restrict the flow of water.
   1. Install tapered edge strips at perimeter edges of the roof that do not terminate at vertical surfaces.

D. Adhered Cover Board: Adhere cover board to the substrate as follows:
   1. Install in a two-part urethane adhesive according to the roofing system manufacturer's instruction.
   2. Install to resist uplift pressure at corners, perimeter, and field of the roof.

3.07 MEMBRANE PLACEMENT AND SECUREMENT

A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.

B. Shingle joints on sloped substrate in direction of drainage.

C. Adhered Application: Apply adhesive at manufacturer's recommended rate. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.

D. Additional Membrane Securement: The membrane must be secured at the perimeter of each roof level, roof section, expansion joint, curb, skylight, penthouse, etc., at any angle change which exceeds 2-inches in one horizontal foot, and at all other penetrations in accordance with the manufacturer's requirements.

E. Seam Welding:
   1. Seam Welding: Overlap edges and ends and seal seams by heat welding, minimum 2 inches.
   2. Cover seams with manufacturer's recommended joint covers.
   3. Probe seams once welds have thoroughly cooled, in approximately 30 minutes.
   4. Repair deficient seams within the same day.
   5. Seal cut edges of reinforced membrane after seam probe is complete.

F. Flashing:
   1. Flashing of parapets, curbs, expansion joints, and other parts of the roof must be performed using Sure-Weld reinforced membrane or prefabricated accessories. Sure-Weld non-reinforced membrane may be used for flashing pipe penetrations, Sealant Pockets, and scuppers, as well as inside and outside corners when the use of pre-molded or prefabricated accessories is not feasible.
      a. Follow manufacturer's typical flashing procedures for all wall, curb, and penetration flashing including metal edging/coping and roof drain applications.
   2. At intersections with vertical surfaces:
      a. Extend membrane over cant strips and up a minimum of 4 inches onto vertical surfaces.
      b. Fully adhere flexible flashing over membrane and up to nailing strips.
      c. Secure flashing to nailing strips at 4 inches on center.
      d. Insert flashing into reglets and secure.

G. Install roofing expansion joints where indicated. Make joints watertight.

H. Install prefabricated joint components in accordance with manufacturer's instructions.

I. Coordinate installation of roof drains and sumps and related flashings. Locate all field splices away from low areas and roof drains. Lap upslope sheet over downslope sheet.

J. Install walkway pads at areas of concentrated traffic and as shown on Drawings. Space pad joints to permit drainage.

K. Daily Seal: Install daily seal per manufacturers instructions at the end of each work day. Prevent infiltration of water at incomplete flashings, terminations, and at unfinished membrane edges.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: The Owner may engage a qualified testing agency to perform tests and inspections and to prepare test reports.
   1. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
      a. Approximate quantities of components within the roofing membrane will be determined according to ASTM D 3617.
      b. Repair areas where test cuts were made according to the roofing system manufacturer's written instructions.

B. Manufacturers Field Services and Reports:
   1. Field Visits: The roofing manufacturer shall provide a qualified, trained auditor to perform a minimum of three (3) field visits to the Project during installation of the roofing to inspect the site conditions, condition of surfaces and installation, quality of workmanship, as applicable, and to initiate instructions when necessary.
      a. Upon completion of the field visits, copies of the inspection reports will be provided to the Architect and Contractor. Any corrective action deemed necessary to comply with the manufacturer's specifications must be completed prior to the final inspection.
   2. Final Inspection: The roofing system manufacturer shall provide a qualified, trained auditor to perform a final inspection to ensure the roof system has been installed properly and according to the manufacturer's recommendations and guarantee requirements.
      a. Upon completion of the final inspection, copies of the inspection report will be provided to the Architect and Contractor. Any corrective action deemed necessary to comply with the manufacturer's specifications must be completed prior to final close-out.

C. The roofing system will be considered defective if it does not pass tests and inspections.

D. Additional testing and inspecting, at the Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.09 CLEAN UP

A. Perform daily clean-up to collect all wrappings, empty containers, paper, and other debris from the project site. Upon completion, all debris must be disposed of in a legally acceptable manner.

B. 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.

3.10 PROTECTION

A. Protect installed roofing until Substantial Completion.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION 07 54 23

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, and exterior penetrations.

B. Sealants for joints within sheet metal fabrications.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

B. CDA A4050 - Copper in Architecture - Handbook; Current Edition.

C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 3 years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Sheet Metal Flashing and Trim Manufacturers:
   1. ALUCOBOND USA: www.alucobondusa.com/#sle.
   2. Substitutions: Not permitted.

2.02 SHEET MATERIALS

A. Pre-Finished Aluminum: ASTM B209/B209M; 18 gauge, 0.040 inch thick; plain finish shop pre-coated with silicone modified polyester coating.
   1. Polyvinylidene Fluoride (PVDF) Coating: Superior performing organic powder coating, AAMA 2605; pretreated metal with two coat system including primer and color coat with at least 70 percent PVDF coating.
   2. Color/s: As indicated on drawings.

2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.04 EXTERIOR PENETRATION FLASHING PANELS

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.

2.05 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Primer: Zinc chromate type.

C. Concealed Sealants: Non-curing butyl sealant.

D. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.03 INSTALLATION

A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

B. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

3.04 FIELD QUALITY CONTROL

A. See Section 013300 for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

END OF SECTION 07 62 00

SECTION 07 71 23
MANUFACTURED SCUPPER, GUTTERS, AND DOWNSPOUTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Prefinished Metal Downspouts, Scuppers, and Collection Boxes

1.02 RELATED REQUIREMENTS

A. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 REFERENCE STANDARDS

A. ASTM B32 - Standard Specification for Solder Metal; 2020.

B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.

B. Comply with applicable code for size and method of rain water discharge.

C. Maintain one copy of each document on site.

1.05 SUBMITTALS

A. Product Data: Provide data on prefabricated components.

B. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Prevent contact with materials that could cause discoloration, staining, or damage.

1.07 WARRANTY

A. Products coated with a fluoropolymer, 70% PVDF finish carry a limited warranty against chalking and fading

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: ATAS International, Inc.: www.atas.com/#sle

B. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
   1. Alside, Inc: www.alside.com/#sle.
   2. Cheney Flashing Company: www.cheneyflashing.com/#sle.
   3. Drexel Metals Inc: www.drexmet.com/#sle.
   4. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
   5. SAF Perimeter Systems (Southern Aluminum Finishing Company, Inc): www.saf.com/persys/#sle.
   6. Substitutions: See section 006325.

2.02 MATERIALS

A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.032 inch thick.

B. Protective Backing Paint: Zinc molybdate alkyd.

C. Solder: ASTM B32; Sn50 (50/50) type.

D. Straps: Aluminum, 0.125-inch thickness

2.03 GUTTERS

A. Basis of Design: ATAS, "Ultra HP Commercial Gutter"
   1. Material: Pre-finished aluminum sheet, 0.032 inch thickness

2. Straps: 0.125-inch x 1-inch wide aluminum straps with internal retention brackets at 30-inches on-center
3. Size: As indicated on Drawings
4. Profile: SMACNA rectangular style profile
5. Length: 12-foot sections
6. Testing / Ratings:
    a. Wind Resistance: ANSI/SPRI GT-1
7. Finish: Shop pre-coated with 70% PVDF (polyvinylidene fluoride) coating
    a. Color: As selected from manufacturer's stock and premium colors.
8. Accessories:
    a. Inside Mitered Corners, sealed
    b. Outside Mitered Corners, sealed
    c. End Caps, sealed
    d. Expansion Joints (when applicable)

2.04 DOWNSPOUTS

A. Basis of Design: ATAS, "Box Downspout"
1. Material: Pre-finished aluminum sheet, 0.063 inch thickness for riveting.
2. Straps: 0.125-inch x 1-inch wide aluminum straps, three (3) per 12-foot section
3. Fabrication: Seamed to maximize water control
4. Size: As indicated on Drawings
5. Profile: SMACNA rectangular style profile
6. Length: 12-foot sections
7. Finish: Shop pre-coated with 70% PVDF (polyvinylidene fluoride) coating
    a. Color: As selected from manufacturer's stock and premium colors.
8. Accessories:
    a. Outlet Tubes
    b. Out Elbows
    c. In Elbows
    d. Right Elbows
    e. Left Elbows

2.05 SCUPPERS

A. Basis of Design: ATAS, "Scuppers"

B. Material: Pre-finished aluminum sheet, 0.063 inch thickness for welding.

C. Fabrication:
1. Blanked and formed using CNC equipment for precise uniform pieces
2. Fully welded and post painted

D. Profile: SMACNA Rectangular profile as detailed in the Drawings.

E. Width: 6- to 24-inches

F. Height: 3- to 12-inches

G. Depth: 6- to 24-inches

H. Finish: Shop pre-coated with 70% PVDF (polyvinylidene fluoride) coating
1. Color: As selected from manufacturer's stock and premium colors.

2.06 COLLECTOR BOXES

A. Basis of Design: ATAS, "Collector Boxes"

B. Material: Pre-finished aluminum sheet, 0.063 inch thickness for welding.

C. Fabrication:
1. Blanked and formed using CNC equipment for precise uniform pieces
2. Fully welded and post painted

D. Profile: Collector Box has a rectangular top section with a lower section tapering to an outlet tube. The face of the top section has an overflow opening.

E. Configuration: As indicated on the Drawings

F. Finish: Shop pre-coated with 70% PVDF (polyvinylidene fluoride) coating
   1. Color: As selected from manufacturer's stock and premium colors.

2.07 FABRICATION

A. Form downspouts, scuppers, and collection boxes of profiles and size indicated.

B. Fabricate with required connection pieces.

C. Form sections square, true, and accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance. Allow for expansion at joints.

D. Hem exposed edges of metal.

E. Fabricate gutter and downspout accessories; seal watertight.

2.08 FINISHES

A. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat applied by panel manufacturer on a continuous coil coating line, with a top side dry film thickness of 0.75± 0.05 mil (0.019± 0.0013 mm) over 0.2± 0.05 mil (0.05± 0.0013 mm) primer coat, to provide a total dry film thickness of 0.95± 0.10 mil (0.024± 0.0025 mm). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   1. Color: As selected from manufacturer's stock and premium colors.

2.09 ACCESSORIES

A. Splash Pads: Precast concrete type, size and profiles indicated; minimum 3,000 psi at 28 days, with minimum 5 percent air entrainment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Paint concealed metal surfaces and surfaces in contact with dissimilar metals with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.03 INSTALLATION

A. Install downspouts, scuppers, collection boxes, and accessories in accordance with manufacturer's instructions.

B. Slope gutters 1/4 inch per foot, minimum

C. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

D. Connect downspouts to storm sewer system. Seal connection watertight.

E. Set splash pans under downspouts.

SECTION 07 72 00
ROOF ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof walkways and platforms.

B. Non-penetrating rooftop support assemblies.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 54 23 - Thermoplastic Polyolefin (TPO) Membrane Roofing

C. Section 07 62 00 - Sheet Metal Flashing and Trim

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

1.04 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used.
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Maintenance requirements.

B. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
   1. Non-penetrating Rooftop Supports: Submit design calculations for loadings and spacings.

C. Warranty Documentation:
   1. Submit manufacturer warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in producing products similar to those indicated for this Project.

B. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing roof accessories to attain designed operational performance.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store products under cover and elevated above grade.

1.07 WARRANTY

A. Correct defective Work within a one year period after the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 ROOF HATCHES:

A. Manufacturers:
   1. Acudor Products Inc: www.acudor.com/#sle.
   2. Babcock-Davis: www.babcockdavis.com/#sle.
   3. Bilco Company: www.bilco.com/#sle.
   4. LMCurbs: www.lmcurbs.com/#sle.
   5. Milcor, Inc: www.milcorinc.com/#sle.

6. Substitutions: See section 006325.

B. Roof Hatches : Factory-assembled galvanized steel frame , complete with operating and release hardware.
   1. Style: Provide flat metal covers unless otherwise indicated.
   2. Mounting: Provide frames and curbs suitable for mounting conditions as indicated on drawings.
   3. Thermally Broken Hatches: Provide insulation within frame and cover.
   4. Size and Product:
      a. For Fixed Wall Ladder Access: Single leaf; 36 by 36 inches.
         1) Product: Bilco, Type E-40; Aluminum cover and galvanized steel curb, single leaf roof hatch, or equivalent.

C. Roof Hatch Accessories:

2.03 NON-PENETRATING ROOFTOP SUPPORT ASSEMBLIES

A. Description: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, and not requiring any attachment to roof structure and not penetrating roofing assembly.
   1. Design Loadings and Configurations: As required by applicable codes.
   2. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
   3. Steel Components: Carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
   4. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
   5. Manufacturers:
      a. Metal Roof Innovations, Ltd.;: www.s-5.com/#sle.
      b. PHP Systems/Design: www.phpsd.com/#sle.
      c. Portals Plus: www.portalsplus.com/#sle.
      d. Substitutions: See sectuib 993625.

B. Roof Walkways and Platforms: Non-penetrating, mechanically attached walkway system installed over standing seam metal roofs.
   1. Dimensions: As indicated on drawings.
   2. Grating Length: Manufacturer's standard length.
   3. Provide support plate assemblies and attachment hardware in compliance with manufacturer's written instructions in accordance with installation requirements.

2.04 SNOW GUARDS

A. Unit Snow Guards: Individual projecting polycarbonate shapes, attached to standing seams of roof panel, and _____ to roof deck.
   1. Projecting Polycarbonate Shapes: Clear polycarbonate plastic with UV stabilizers, semi-circular design.

B. Fence Type Snow Guard: Continuous snow guard; manufacturer's standard pipe, bar, channel, or solid rod, set in brackets or posts, with optional plates and metal trim to match roof.
   1. Solid Rod: Aluminum, mill finish.
   2. Extruded Aluminum Channel: Manufacturer's standard shape; with slot for insertion of metal trim matching roof.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

3.05 PROTECTION

A. Protect installed products until Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

A. Section 07 05 53 - Fire and Smoke Assembly Identification.

B. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

B. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus; 2020.

C. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013 (Reapproved 2017).

D. FM (AG) - FM Approval Guide; current edition.

E. ITS (DIR) - Directory of Listed Products; Current Edition.

F. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

G. UL (DIR) - Online Certifications Directory; Current Edition.

H. UL (FRD) - Fire Resistance Directory; Current Edition.

1.04 SUBMITTALS

A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

C. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.

D. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Certificate from authority having jurisdiction indicating approval of materials used.

G. Manufacturer's qualification statement.

H. Installer's qualification statement.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Installer Qualifications: Company specializing in performing the work of this section and:

1. Trained by manufacturer.
2. Verification of minimum three years documented experience installing work of this type.

1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
3. Everkem Diversified Products, Inc: www.everkemproducts.com/#sle.
4. Hilti, Inc: www.us.hilti.com/#sle (Basis of Design)
5. HoldRite, a Brand of Reliance Worldwide Corporation: www.holdrite.com/#sle.
6. Nelson FireStop Products: www.nelsonfirestop.com/#sle.
7. Passive Fire Protection Partners: www.firestop.com/#sle.
8. Specified Technologies Inc: www.stifirestop.com/#sle.
9. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
10. Substitutions: See section 006325.

2.02 MATERIALS

A. Firestopping Materials: Any materials meeting requirements.

B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

C. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

E. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
1. Movement: Provide systems that have been tested to show movement capability as indicated.
2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
3. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
1. Movement: Provide systems that have been tested to show movement capability as indicated.

C. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
3. Watertightness: Provide systems that have been tested to show W Rating as indicated.

4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING FOR PERIMETER CONTAINMENT

A. Perimeter Joint Systems That Have Not Been Tested For Movement Capabilities (Static-S):
   1. 2 Hour Construction: UL System CW-S-0002; Specified Technologies Inc. AS200 Elastomeric Spray.

2.05 FIRESTOPPING PENETRATIONS THROUGH GYPSUM BOARD WALLS

A. Blank Openings:
   1. 1 Hour Construction: UL System W-L-0020; Specified Technologies Inc. Composite Sheet.
   2. 1 Hour Construction: UL System W-L-0032; Specified Technologies Inc. FP Intumescent Firestop Plug.
   3. 1 Hour Construction: UL System W-L-0038; Specified Technologies Inc. FP Intumescent Firestop Plug.
   4. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.

B. Penetrations By:
   1. Multiple Penetrations in Large Openings:
      a. 1 Hour Construction: UL System W-L-1408; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-8013; Hilti CFS-BL Firestop Block.
      c. 1 Hour Construction: UL System W-L-8025; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
      d. 1 Hour Construction: UL System W-L-8050; Specified Technologies Inc. SSB Intumescent Firestop pillows.
      e. 1 Hour Construction: UL System W-L-8071; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      f. 1 Hour Construction: UL System W-L-8073; Specified Technologies Inc. Composite Sheet.
      g. 1 Hour Construction: UL System W-L-8079; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   2. Uninsulated Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-L-1049; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
      b. 1 Hour Construction: UL System W-L-1054; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      c. 1 Hour Construction: UL System W-L-1090; Specified Technologies Inc. LC Endothermic Firestop Sealant.
      d. 1 Hour Construction: UL System W-L-1164; Hilti FS-ONE MAX Intumescent Firestop Sealant.
      e. 1 Hour Construction: UL System W-L-1222; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
      f. 1 Hour Construction: UL System W-L-1477; Specified Technologies Inc. EZ Firestop Grommet.
      g. 1 Hour Construction: UL System W-L-1506; Hilti CFS-D Firestop Cable Disc.
   3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
      a. 1 Hour Construction: UL System W-L-2048; Specified Technologies Inc. SSW wrap strips.
      b. 1 Hour Construction: UL System W-L-2074; Specified Technologies Inc. SSC collars.
      c. 1 Hour Construction: UL System W-L-2078; Hilti CP 643N/644 Firestop Collar.
      d. 1 Hour Construction: UL System W-L-2128; Hilti FS-ONE MAX Intumescent Firestop Sealant.

e. 1 Hour Construction: UL System W-L-2237; Specified Technologies Inc. LCC Intumescent Firestop Collars.
f. 1 Hour Construction: UL System W-L-2241; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (for wood frame construction).
g. 1 Hour Construction: UL System W-L-2243; Specified Technologies Inc. SSW wrap strips.
h. 1 Hour Construction: UL System W-L-2493; Specified Technologies Inc. RTC range-taking collar.

4. Electrical Cables Not In Conduit:
a. 1 Hour Construction: UL System W-L-3065; Hilti FS-ONE MAX Intumescent Firestop Sealant, CP 606 Flexible Firestop Sealant, CD 601S Elastomeric Firestop Sealant, or CP 618 Firestop Putty Stick.
b. 1 Hour Construction: UL System W-L-3076; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
c. 1 Hour Construction: UL System W-L-3084; Specified Technologies Inc. SSB Intumescent Firestop pillows.
d. 1 Hour Construction: UL System W-L-3135; Specified Technologies Inc. SSP Firestop Putty.
e. 1 Hour Construction: UL System W-L-3169; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
f. 1 Hour Construction: UL System W-L-3218; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
g. 1 Hour Construction: UL System W-L-3255; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
h. 1 Hour Construction: UL System W-L-3256; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
i. 1 Hour Construction: UL System W-L-3265; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.
j. 1 Hour Construction: UL System W-L-3303; Specified Technologies Inc. Ready Split Sleeve.
k. 1 Hour Construction: UL System W-L-3306; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
l. 1 Hour Construction: UL System W-L-3334; Hilti CP 653 Speed Sleeve.
m. 1 Hour Construction: UL System W-L-3350; Specified Technologies Inc. LC Endothermic Firestop Sealant.
n. 1 Hour Construction: UL System W-L-3357; Specified Technologies Inc. FP Intumescent Firestop Plug.
o. 1 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready Split Sleeve.
p. 1 Hour Construction: UL System W-L-3358; Specified Technologies Inc. Ready-Sleeve.
q. 1 Hour Construction: UL System W-L-3369; Specified Technologies Inc. EZ Firestop Grommet.
r. 1 Hour Construction: UL System W-L-3370; Specified Technologies Inc. EZ Firestop Grommet.
s. 1 Hour Construction: UL System W-L-3374; Specified Technologies Inc. FP Intumescent Firestop Plug.
t. 1 Hour Construction: UL System W-L-3376; Specified Technologies Inc. Ready-Sleeve.
u. 1 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 22 Fire-Rated Pathway.
v. 1 Hour Construction: UL System W-L-3377; Specified Technologies Inc. EZ-Path Series 33 Fire-Rated Pathway.

w. 1 Hour Construction: UL System W-L-3378; Specified Technologies Inc. EZ Firestop Grommet.
x. 1 Hour Construction: UL System W-L-3379; Specified Technologies Inc. EZ Firestop Grommet.
y. 1 Hour Construction: UL System W-L-3390; Specified Technologies Inc. EZ-Path Series 44 Fire-Rated Pathway.
z. 1 Hour Construction: UL System W-L-3393; Hilti CFS-SL RK Retrofit Sleeve Kit for existing cables.
aa. 1 Hour Construction: UL System W-L-3414; Hilti CFS-D Firestop Cable Disc.

5. Cable Trays with Electrical Cables:
   a. 1 Hour Construction: UL System W-L-4008; Specified Technologies Inc. SSB Intumescent Firestop pillows.
   b. 1 Hour Construction: UL System W-L-4011; Hilti CFS-BL Firestop Block.
   c. 1 Hour Construction: UL System W-L-4060; Hilti FS-ONE MAX Intumescent Firestop Sealant.
6. Insulated Pipes:
   a. 1 Hour Construction: UL System W-L-5014; Specified Technologies Inc. SSS Intumescent Firestop Sealant.
   b. 1 Hour Construction: UL System W-L-5028; Hilti FS-ONE MAX Intumescent Firestop Sealant.
   c. 1 Hour Construction: UL System W-L-5029; Hilti FS-ONE Intumescent Firestop Sealant.
   d. 1 Hour Construction: UL System W-L-5121; Specified Technologies Inc. LCI Intumescent Firestop Sealant.
   e. 1 Hour Construction: UL System W-L-5273; Specified Technologies Inc. LC Endothermic Firestop Sealant.
   f. 1 Hour Construction: UL System W-L-5298; Specified Technologies Inc. WF300 Intumescent Firestop Caulk (for wood frame construction).
7. HVAC Ducts, Insulated:
   a. 1 Hour Construction: UL System W-L-7164; Specified Technologies Inc. FyreFlange HVAC Firestop Angle.
   b. 1 Hour Construction: UL System W-L-7238; Specified Technologies Inc. FyreFlange HVAC Firestop Angle.
   c. 1 Hour Construction: UL System W-L-7156; Hilti FS-ONE MAX Intumescent Firestop Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.

3.04 FIELD QUALITY CONTROL

A. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 84 00

SECTION 07 92 00
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

B. Section 094000: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer; 2015 (Reapproved 2022).

B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants; 2018 (Reapproved 2022).

C. ASTM C834 - Standard Specification for Latex Sealants; 2017.

D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2022.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2016.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2022.

I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2019 (Reapproved 2020).

J. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2022.

K. SCAQMD 1168 - Adhesive and Sealant Applications; 1989, with Amendment (2022).

L. UL 263 - Standard for Fire Tests of Building Construction and Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   7. Sample product warranty.
   8. Certification by manufacturer indicating that product complies with specification requirements.

B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

E. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

F. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

G. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

H. Manufacturer's qualification statement.

I. Installer's qualification statement.

J. Executed warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver sufficient samples to manufacturer for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.

E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
   1. Identification of testing agency.
   2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
      a. Test date.
      b. Copy of test method documents.
      c. Age of sealant upon date of testing.
      d. Test results, modeled after the sample form in the test method document.
      e. Indicate use of photographic record of test.

F. Field Adhesion Test Procedures:
   1. Allow sealants to fully cure as recommended by manufacturer before testing.
   2. Have a copy of the test method document available during tests.
   3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.

4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

G. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inches long.
2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.

1.06 WARRANTY

A. See Section 013300 for additional warranty requirements.

B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Nonsag Sealants:
1. Dow: www.dow.com/#sle.
2. Hilti, Inc: www.hilti.com/#sle.
3. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
4. Pecora Corporation: www.pecora.com/#sle.
5. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
6. Sika Corporation: www.usa.sika.com/#sle.
7. Specified Technologies Inc: www.stifirestop.com/#sle.
8. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
9. W.R. Meadows, Inc: www.wrmeadows.com/#sle.
10. Substitutions: See section 006325.

2.02 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
   e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.

1) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated.

c. Other joints indicated below.

3. Do not seal the following types of joints:
   a. Intentional weep holes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
   c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   d. Joints where installation of sealant is specified in another section.
   e. Joints between suspended panel ceilings/grid and walls.

B. Type ___ - Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

C. Interior Joints: Use nonsag polyurethane sealant, unless otherwise indicated.
   1. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.

D. Sound-Rated Assemblies: Walls and ceilings identified as STC-rated, sound-rated, or acoustical.

2.03 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

B. Colors: As indicated on drawings.

2.04 NONSAG JOINT SEALANTS

A. Type JS-2 - Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus ____ percent, minimum.
   2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
   3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
   4. Color: To be selected by Architect from manufacturer's standard range.
   5. Service Temperature Range: Minus 20 to 180 degrees F.
   6. Products:
      a. Dow; DOWSIL 795 Silicone Building Sealant: www.dow.com/#sle.
      b. Momentive Performance Materials, Inc/GE Silicones; SCS9000 SilPruf NB - Non-Staining Silicone Weatherproofing Sealant: www.siliconeforbuilding.com/#sle.
      c. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com/#sle.
      d. Tremco Commercial Sealants & Waterproofing; Spectrem 2: www.tremcosealants.com/#sle.

B. Type JS-5 - Polyurethane Sealant: ASTM C920, Grade NS, Uses NT, M, and A; single component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus ____ percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Products:
      a. Pecora Corporation; DynaTrol II: www.pecora.com/#sle.
      b. Tremco Commercial Sealants & Waterproofing; Dymeric 240 FC: www.tremcosealants.com/#sle.
      c. W. R. Meadows, Inc; POURTHANE NS: www.wrmeadows.com/#sle.

C. Nonsag Traffic-Grade Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion and traffic without the necessity to recess sealant below traffic surface.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.

D. Type JS-9 - Tamper-Resistant Polyurethane Sealant: ASTM C920, Grade NS, Uses M, G, and A; single or multicomponent; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 12-1/2 percent, minimum.
   2. Hardness Range: 50 to 60, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Service Temperature Range: Minus 40 to 180 degrees F.
   5. Products:
      a. Pecora Corporation; Dyna Flex SC.
      b. Sika Corporation; SikaFlex- 11FC.
      c. BASF Corporation; MasterSeal CR-195.

E. Type JS-7 - Acrylic Emulsion Latex: Water-based; ASTM C834, single component, nonstaining, nonbleeding, nonsagging; not intended for exterior use.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Grade: ASTM C834; Grade 0 Degrees F (Minus 18 Degrees C).
   3. Products:
      a. Pecora Corporation; AC-20+.
      b. Tremco Incorporated; Tremflex 834.
      c. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
      d. Specified Technologies Inc; Smoke N' Sound Acoustical Sealant: www.stifirestop.com/#sle.
      e. Tremco Commercial Sealants & Waterproofing; Tremflex 834: www.tremcosealants.com/#sle.

F. Type JS-8 - Acrylic Latex Sealant: ASTM C834; for use as acoustical sealant and in firestopping systems for expansion joints and through penetrations.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Fire Rated System: Complies with UL 263 and ASTM E119 with UL fire resistance classifications.
   3. Products:
      a. Pecora Corporation; AC-20 FTR (Fire and Temperature Rated): www.pecora.com/#sle.
      b. Grabber; Acoustical Sound and Smoke Sealant #GSCSF
      c. DAP; Sound Block E90 Acoustical Sound & Draft Sealant
      d. Pecora Corporation; AIS-919 Acoustical Latex Sealant
      e. USG Corporation; SHEETROCK Acoustical Sealant
      f. GE; RCS20 Siliconized Acrylic Sealant

2.05 SELF-LEVELING JOINT SEALANTS

A. Type JS-4 - Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multicomponent; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Color: To be selected by Architect from manufacturer's standard range.
   3. Service Temperature Range: Minus 40 to 180 degrees F.
   4. Products:
      a. Polycoat Products; Dynatrol II: www.polycoatusa.com/#sle.
      b. Sherwin-Williams Company; Loxon 2K SL: www.sherwin-williams.com/#sle.
      c. Sika Corporation; Sikaflex-2c SL: www.usa.sika.com/#sle.

d. Tremco Incorporated; Vulkem 245.

B. Type JS-3 - Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M, and O; multicomponent; explicitly approved by manufacturer for horizontal expansion joints.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Products:
      a. BASF Building Systems; Sonolastic SL 1.
      b. Pecora Corporation; Urexpan NR-200.
      c. Tremco Commercial Sealants & Waterproofing; Vulkem 45.

2.06 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, nonstaining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Noncorrosive and nonstaining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; nonstaining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
   3. Record each test on Preinstallation Adhesion Test Log as indicated.
   4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
   5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Provide joint sealant installations complying with ASTM C1193.

C. Install acoustical sealant application work in accordance with ASTM C919.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

A. See Section 013300 for additional requirements.

B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION 07 92 00

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-frated hollow metal doors and frames.

B. Fire-rated hollow metal doors and frames.

C. Thermally insulated hollow metal doors with frames.

D. Hollow metal borrowed lite glazing frames, sdelights, etc.

1.02 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing

B. Section 08 71 00-Door Hardware

C. Section 08 80 00 - Glazing

D. Section 09 21 16 - Gypsum Board Assemblies

E. Section 09 90 00 - Painting and Coatings

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. ASCE: American Society of Civil Engineers.

C. HMMA: Hollow Metal Manufacturers Association.

D. NAAMM: National Association of Architectural Metal Manufacturers.

E. NFPA: National Fire Protection Association.

F. SDI: Steel Door Institute.

G. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI A250.4 - American National Standard Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings.; 2011.

C. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.

D. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

E. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021.

H. 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; 2018a.

I. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

J. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

K. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

O. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

Q. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.

R. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2022.

S. UL 10B - Standard for Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

T. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

U. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.05 SUBMITTALS

A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

B. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

F. Manufacturer's Qualification Statement.

G. Installer's Qualification Statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: https://steeldoor.org/sdi-certified/#sle.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

C. Fire-Rated Door and Frame Assemblies: When specified, manufacturers shall provide the type of fire door and frame assembly that has been tested in accordance with ANSI/UL 10B, ANSI/UL 10C, or ANSI/NFPA 252.
   1. The assembly shall be identified by labels and/or an approved identification marking of an agency accepted by the authority having jurisdiction.
   2. The door label shall indicate the applicable fire test rating for the door construction furnished.

D. Smoke and Draft Control Doors (Indicated with letter "S" on Drawings and/or Door Schedule): Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
   1. Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
   2. Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
   3. Label: Include the "S" label on fire-rating label of door.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

C. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

1.08 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.09 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Steelcraft.

B. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
   4. Technical Glass Products: www.tgpamerica.com/#sle.
   5. Substitutions: See section 006325.

2.02 PERFORMANCE REQUIREMENTS

A. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

B. Classification:Level, Performance, and Model: Hollow metal doors, frames, frame anchors, and hardware reinforcings shall be provided to meet the requirements of ANSI A250.4.

C. Accessibility: Comply with ICC A117.1 and ADA Standards.

D. End Channels or Closures: Flush end closure channel, with top and door faces aligned.

E. Door Edges: Manufacturers standard for application indicated.

F. Door Faces: Full Flush .

G. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.

H. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

I. Zinc Coating: Provide metal components with zinc-coated (galvanized) and zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness.
   1. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.

J. Hollow Metal Panels: Same construction, performance, and finish as doors.

K. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

A. Type F-1: Exterior Metal Doors
   1. Product: Steelcraft; L / SL Series (Laminated).
   2. ANSI/SDI A250.8: Classification:
      a. Level 3 - Extra Heavy-duty 3 - Extra Heavy-duty.
      b. Physical Performance: Level A, 1,000,000 cycles; in accordance with
      c. Model: 1 - Full Flush.
   3. Face Thickness: 16 gage, 0.053 inch, minimum.
   4. Zinc Coating: A60/ZF180 galvannealed coating, per ASTM A653/A653M.
   5. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
      a. Thermal Resistance: R-Value of 6.0 minimum.
   6. Door Thickness: 1-3/4 inches, nominal.
   7. Door Edges: Manufacturers standard for application indicated.
   8. Finish: Factory primed and field finished.

B. Interior Meal Doors:
   1. Product: Steelcraft; Model L / SL Series (Laminated), Full Flush Hollow Metal Doors.
   2. Fire-Rated Doors: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests")
   3. Smoke and Draft Control Doors: When specified, smoke and draft control doors are identified with letter "S" on the "Door Schedule" in the Drawings.
   4. ANSI/SDI A250.8: Classification:
      a. Level 2 - Heavy-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Model 1 - Full Flush.
   5. Face Thickness: 20 gage, 0.032 inch, minimum.
   6. Zinc Coating: Not required.
   7. Core Material: Manufacturers standard core material/construction and in compliance with requirements.
   8. Door Thickness: 1-3/4 inch.
   9. Door Edges: Manufacturers standard for application indicated.
   10. Door Finish: Factory primed and field finished.

2.04 HOLLOW METAL FRAMES

A. Product: Steelcraft; as follows:
   1. F Series: Double rabbet and Cased opening set-up and welded frame.
      a. Fire-Rated Frames: As indicated in the Drawings.
   2. FE Series: Double egress, set-up and welded frame.
      a. Fire-Rated Frames: As indicated in the Drawings.
   3. Lead-Lined Frame.

B. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

C. EXTERIOR Door Frames:
   1. Fabrication: Full profile/continuously welded type.
      a. Profile: Double rabbet, 2 inch (51 mm) face dimension with 5/8 inch (16 mm) high stop, and types and throat dimensions indicated on the Door Schedule.
      b. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

2. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
3. Coating: Metal components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
4. Fire Rating: Supply frame units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.
5. Frame Finish: Factory primed and field finished.
6. Weatherstripping: Separate, see Section 08 71 00

D. INTERIOR Door Frames:
1. Fabrication: Full profile/continuously welded type.
   a. Profile: Double rabbet and Double egress, 2 inch (51 mm) face dimension with 5/8 inch (16 mm) high stop, and types and throat dimensions indicated on the Door Schedule.
   b. Frame Metal Thickness:
      1) Doors under 48-inches wide: 16 gage, 0.053 inch, uncoated.
      2) Doors over 48-inches wide: 14 gage, 0.067 inch, uncoated.
      3) Borrowed Lite Glazed Frames: 16 gage, 0.053 inch, uncoated.
   c. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
   d. Coating: Uncoated, unless indicated otherwise.
2. Fire Rating: Supply frame units bearing Labels for fire ratings indicated in Door Schedule for the locations indicated.
3. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
4. Frame Finish: Factory primed and field finished.

E. Borrowed Lite Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

F. Transom Bars: Fixed, of profile same as jamb and head.

G. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

H. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.

I. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FRAME ANCHORS

A. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.

C. Post-installed Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) 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.

D. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

E. All anchors in exterior walls shall be hot dip galvanized with non-corrosive anchors.

2.06 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.07 ACCESSORIES

A. Vision Lite Frames: Door lite frames with glazing securely fastened within door opening.
   1. Size: As indicated on drawings.
   2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
   3. Frame Finish: Beige polyester powder coating.
   4. Glazing: As specified in Section 08 80 00, factory glazed.

B. Removable Stops for Borrowed Lite Glazed Frames: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Astragals and Edges for Double Doors: Pairs of door astragals, and door edge sealing and protection devices.
   1. UL listed products in compliance with requirements of authorities having jurisdiction.
   2. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
   3. Astragal Type: Split, two parts, and with automatic locking, cutouts for other door hardware, and sealing gasket.
   4. Edge Type: Beveled edge
   5. Material: Aluminum.
   6. Metal Finish: Beige powder coating.
   7. Provide non-corroding fasteners at exterior locations.

D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

E. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

F. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 71 00.

F. Comply with glazing installation requirements of Section 08 80 00.

G. Coordinate installation of electrical connections to electrical hardware items.

H. Touch up damaged factory finishes.

I. Caulk joint between interior door frames and adjoining floor construction. Refer to Section 07 92 00 for requirements.

3.04 TOLERANCES

A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING AND CLEANING

A. Adjust for smooth and balanced door movement.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Touch-up:

1. 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.

END OF SECTION 08 11 13

SECTION 08 11 69
FEMA METAL STORM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. FEMA (Tornado) safe room doors and frames

1.02 RELATED REQUIREMENTS

A. Section 034100 - Precast Structural Concrete

B. Section 08 72 00 - Door Hardware

C. Section 08 80 00 - Glazing

D. Section 09 90 00 - Painting and Coating

1.03 REFERENCES

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

B. ASTM A924/A924M - Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.

C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, High Strength Low-Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

D. ASTM E330 – Test Method E330 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

E. ASTM E1886 – Test Method E1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.

F. ASTM E1996 - Test method E1996 performance of exterior windows, curtains walls, doors and storm shutters impacted by wind borne debris in hurricanes.

G. ICC 500 - ICC/NSSA Standard for the Design and Construction of Storm Shelters

H. Federal Emergency Management Agency (FEMA): FEMA P-320 and FEMA P-361

I. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

J. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives

K. NFPA 252 - Standard Method of Fire Tests of Door Assemblies

L. UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies

M. UL 1784 - Air Leakage Tests of Door Assemblies

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. Delegated Design: Design exterior metal doors and door frames, including comprehensive engineering analysis by a qualified professional engineer, using the design criteria specified below.

1. General Design Criteria:
    a. Building Code: 2018 IBC
    b. Risk Category: IV - Essential Facilities
    c. ASCE 7-16
    d. ICC 500-2020
    e. Design Wind Speed for Tornadoes (ICC500, 304.2(1)): 250 mph
2. Seismic Design Criteria (when applicable):
    a. Refer to the Structural Drawings for the following design criteria:
        1) Seismic Design Category

2) Site Classification
3) Seismic Force-Resisting System
4) Seismic Loads: Spectral Response Acceleration Value (S_a)
5) Component Importance Factor (I_e)

b. Refer to the Mechanical and Electrical Documents for additional seismic design/ detailing requirements.

3. Wind-Resistance Design Criteria:
   a. Refer to the Structural Drawings for the following design criteria:
      1) Ultimate Design Wind Speed, V_{ULT}
      2) Exposure Category
      3) Surface Exposure Category
      4) Building Enclosure Classification (A or B)

1.05 SUBMITTALS

A. Product Data: Manufacturer's data sheets and specifications

B. Shop Drawings: Include schedule identifying each unit, with door marks or numbers referencing drawings. Show layout, profiles, product components and anchorage.

C. Certificates: Product certificates signed by the manufacturer certifying material compliance with ANSI A250.8, specified performance characteristics and criteria, and physical requirements.

D. Installation Instructions: Manufacturer's printed installation instructions, if other than as specified in SDI-105.

E. Provide evidence of manufacturer's membership in the Steel Door Institute.

1.06 QUALITY ASSURANCE

A. All products shall conform to the requirements of ANSI A250.8, “SDI 100 Recommended Specifications for Standard Steel Doors and Frames”.

B. STC Rating: 38 (minimum) when tested in accordance with ASTM E90 and E413

C. Fire Rated Doors:
   1. [if !vml][endif][if !vml][endif]Doors shall be tested in accordance with UL 10B, “Fire Tests of Door Assemblies”, NFPA 252, “Fire Tests of Door Assemblies”, and UL 10C, “Positive Pressure Fire Tests of Door Assemblies”.
   2. Doors must have an approved marking or physical label, applied by an authorized facility, in accordance with the procedure set forth by an independent certification agency.

D. Severe Storm Products:
   1. Tornado Doors: Door Systems for Federal Emergency Management Agency (FEMA) community shelters and other areas of refuge meeting the design wind pressures and missile impact loads as detailed in the National Performance Criteria for Tornado Shelters as published by FEMA.

E. Manufacturer Qualifications: Member of the Steel Door Institute.

F. Installer: Minimum five years documented experience installing products specified in this Section.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Proper storage is required to meet the requirements of ANSI/SDI A250.10 and HMMA 840.

1.08 COORDINATION

A. Coordinate Work with other directly affected sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware, electric devices, and recessed items.

B. Coordinate work with frame opening construction, door, and hardware installation.

C. Sequence installation to accommodate required door hardware.

D. Verify field dimensions for factory assembled frames prior to fabrication.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Steelcraft
   1. Other Acceptable Manufacturer: Equivalent products of the manufacturers listed below will be acceptable.
      a. Ceco Door Products
      b. Curries Company: StormPro Doors®
      c. Insulgard Security Products: StormDefend TTH350
      d. Krieger Specialty Products
      e. Metal Products, Inc (MPI)
      f. Republic Doors
   2. Products of unnamed manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
      a. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”

2.02 BASIS OF DESIGN

A. Product: Steelcraft; "Palladin PW14 Glass Light Series Steel Tornado Doors"

B. Fire Rated Doors: Ratings as indicated on Door Schedule, when tested in accordance with NFPA 252 or UL 10B.
   1. Labeled by UL or ITS

C. Performance:
   1. Meets or Exceeds ANSI/SDI A250.8-2014; SDI Level 4, Model 2
   2. Meets or Exceeds FEMA 320
   3. Meets or Exceeds ICC 500
   4. Passes Impact Projectile test (15 lb. 2x4 traveling at 100 mph)
      a. Large Missile Impacts (TAS 201, ASTM E1886/E1996, ANSI A250.13, and ICC 500)
   5. Passes Pressure test (greater than 302 PSF)
      a. Uniform Static Air Pressure (TAS 202, ASTM E330, and ANSI A250.13)
      b. Cyclic Wind Pressure Loading Test (TAS 203, ASTM E1886/E1996, and ANSI A250.13)

2.03 DOORS

A. Construction:
   1. Faces: Full flush (No vertical face seams)
   2. Thickness: 1-3/4 inches
      a. ANSI/SDI A250.8 / SDI 100 Level 4 (Extra Heavy Duty)
   3. Face Material: 14-gauge (0.067-inch min) hot-dipped galvannealed steel having an A60 zinc-iron alloy coating conforming to ASTM A653/A653M and ASTM A924/A924M
   4. Insulated Doors (ASTM C1363): U-value of 0.39, polyurethane core
   5. Insulated Doors (ASTM C1363): U-value of 0.41, polystyrene core
   6. Core: Doors fabricated by laminating panels to a specified core. Core shall be as follows:
      a. 2.5 lb Density mineral fiber between stiffeners
   7. Hinge and Lock Edges: Provide continuous vertical mechanical joints with edge seams welded, filled, and ground smooth.
   8. Bevel lock edge 1/8 inch (3 mm) in 2 inches (50 mm)
   9. Finish: Factory prime finish for field finish (by others)

B. Door Reinforcements:
   1. Reinforcement Channels: Galvannealed 14 gauge (0.067-inch min) top and bottom steel reinforcement channels projection welded to both face sheets on 4-inch (102 mm) centers.
   2. Hinges: 7-gauge (0.167-inch min) galvanized steel, projection welded to the edge of the door.

3. Face Sheets: 18-gauge (0.042-inch) vertical stiffeners manufactured from steel conforming to ASTM A653/A653M and ASTM A924/A924M, welded to each face sheet.
4. Lock Reinforcement: 12-gauge (0.093-inch) channels, full height
5. Closer Reinforcement: 14-gauge box type reinforcement, 18" (457 mm) long

C. Vision Lites:
1. Tornado approved by Intertek per ICC500 testing procedures, fire-rated or non-rated.
2. Vision Lite assembly including glass, steel trim, and bolts to be factory installed only. The light assembly cannot be replaced or modified without nullifying tornado code labels.
3. Material: 18-gauge CRS frame
4. Size: As indicated on the Drawings

2.04 FRAMES

A. Frame Profile: Double rabbeted with 5/8-inch high stops

B. Face Width: 2-inches, unless otherwise indicated

C. Frame Depth: As indicated on Drawings

D. Material: Zinc-iron alloy-coated galvannealed steel, ASTM A653/A653M, Class A60, 14-gauge (0.067-inch) steel.
1. ANSI Level 4 Doors

E. Frame Type: 3-Sided
1. Full Profile/ Continuous Welded Frames: Weld miter joints between head and jamb faces completely along their length either internally or externally. Internally weld perimeter profile joints full length of soffit and rabbets with hairline seams on external meeting surfaces. Grind and finish face joints smooth.

F. Provide two temporary steel spreaders (welded to the jambs at each rabbet of door openings) on welded frames during shipment. Remove temporary steel spreaders prior to installation of the frame.

G. Frames will have 2-inch faces and 5/8-inch high stops, unless otherwise indicated

H. Frame Anchors: Stud-Wall, Masonry, and Post-Installed Expansion types. Refer to Section 08 11 69 for requirements
1. Provide frames with a minimum of six wall anchors and two sill anchors (Additional anchor for every 30-inches over 90-inches)
2. Masonry Construction: Frame must be grouted full. Jamb base anchor is used.
3. Precast Concrete Wall Construction: Factory weld-in tube and strap with punch and dimple and bolts provided.

I. Door Silencers: Prepare frames to receive inserted type door silencers (3) per strike jamb on single doors, and (2) per head for pair of doors.
1. Stick-on silencers are not permitted.

J. Frame Reinforcements:
1. Hinges: 11-gauge (3-mm)
a. Provide high-frequency hinge reinforcement for the top hinge on all exterior, cross corridor, and stairwell frames, in accordance with SDI 111-H, Example “A” Application, where full mortise hinges are specified.
2. Strikes: 11-gauge (1.9-mm)
3. Closers: Minimum 14-gauge (2.6-mm)
4. Projection weld hinge and strike reinforcements to the door frame.

2.05 ELECTRICAL REQUIREMENTS

A. General: Coordination all electrical requirements for doors and frames. Make provisions for installation of electrical items arranged so that wiring can be readily removed and replaced.
1. Provide cutouts and reinforcements required for metal door frame to accept electric components.

2. Frame with Electrical Hinges: Weld UL listed grout guard cover box welded over center hinge reinforcing. Top or bottom hinge locations are not permitted. Contractor to reference 3.01.E, for continuous hinges.
3. Provide cutouts and reinforcements required to accept security system components.
4. Refer to Section 08 71 00 for electrified hardware items.

2.06 HARDWARE

A.

2.07 FACTORY FINISH

A. Doors, frames, and frame components are required to be cleaned, phosphatized, and finished with one coat of baked-on rust-inhibiting prime paint in accordance with the ANSI A250.10.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install doors and frames in accordance with Steel Door Institute's recommended erection instructions for steel frames, ANSI A250.11.

B. Install label doors and frames in accordance with NFPA 80.

C. Remove temporary steel spreaders prior to installation of frames.

D. Set frames accurately in position; plumb, align and brace until permanent anchors are set. After wall construction is complete, remove temporary wood spreaders.

E. Apply hardware in accordance with hardware manufacturers' instructions and Section 08 72 00. Install hardware with only factory-provided fasteners. Adjust door installation to provide uniform clearance at head and jambs, to achieve maximum operational effectiveness and appearance.

3.02 ADJUSTING AND TOUCH-UP

A. Final Adjustments: Adjust operating doors and hardware items just prior to final inspection and acceptance by the Owner. Leave work in complete and proper operating condition.

B. Remove and replace defective work, including doors or frames that are damaged, bowed or otherwise unacceptable.

C. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat, and apply touch-up of compatible air-drying primer.

3.03 PROTECTION

A. Provide protective measures required throughout the construction period to ensure that door and frame units will be without damage or deterioration at the time of acceptance.

END OF SECTION 08 11 69

SECTION 08 12 13
METAL FRAMES FOR WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-rated hollow metal frames for wood doors.

B. Fire-rated hollow metal frames for wood doors.

1.02 RELATED REQUIREMENTS

A. Section 08 14 16 - Flush Wood Doors

B. Section 08 71 00 - Door Hardware (Allegion)

C. Section 08 80 00 - Glazing

D. Section 09 90 00 - Painting and Coatings

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2022.

C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2023.

D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2020.

E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021.

G. 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; 2018a.

H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2020.

I. ASTM C476 - Standard Specification for Grout for Masonry; 2023.

J. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames; 2016.

K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

L. ITS (DIR) - Directory of Listed Products; Current Edition.

M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.

O. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames; 2017.

P. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

Q. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.

R. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies; 2022.

S. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2019.

T. UL (DIR) - Online Certifications Directory; Current Edition.

U. UL 9 - Standard for Fire Tests of Window Assemblies; Current Edition, Including All Revisions.

V. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

W. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced grade standard.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Manufacturer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with a minimum (3) years of documented experience.

B. Manufacturer Qualifications: Provide hollow metal frames from SDI Certified manufacturer: https://steeldoor.org/sdi-certified/#sle.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.
   1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

D. Fire-Rated, Borrowed Lite Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each glazed lite.

E. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

F. Source Limitations: Obtain metalwork from a single source from a single manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in accordance with applicable requirements and in compliance with standards and/or custom guidelines as indicated.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Steelcraft

B. Other Acceptable Manufacturers: Equivalent products of the manufacturers listed below will be acceptable.
   1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
   3. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
   4. Substitutions: See section 006325.

2.02 PERFORMANCE REQUIREMENTS

A. Refer to the "Door Schedule" in the drawings for frame sizes, fire ratings, sound ratings, finishing, door hardware to be installed, and other variations, if any.

B. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.

C. Accessibility: Comply with ICC A117.1 and ADA Standards.

D. Glazed Lights: Non-removable stops on the secure side; sizes and configurations indicated on drawings. Style: Manufacturers standard.

E. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior frame that is also indicated as being sound-rated must comply with the requirements specified for exterior frames and for sound-rated frames; where two requirements conflict, comply with the most stringent.

F. Hardware Preparations, Selections and Locations: Comply with BHMA A156.115, NAAMM HMMA 830, NAAMM HMMA 831 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

G. Zinc Coating for Units Subject to Corrosive Conditions: Components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise.

H. Mullions for Pairs of Doors (when applicable): Removable type, with profile similar to jambs.

I. Transom Bars (when applicable): Fixed, of profile same as jamb and head.

J. Frames for Interior Glazing or Borrowed Lites: Construction and face dimensions to match door frames, and as indicated on drawings.

K. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into head of frame, and flush with top.

2.03 METAL DOOR FRAMES

A. Specified Manufacturer: Steelcraft
   1. Products:
      a. F Series: Double rabbet frame construction, Full profile/continuously welded type
      b. FE and DE Series: Double egress frame construction, Full profile/continuously welded type
      c. Fire-Rated Frames.

B. Frame Finish: Factory primed and field finished

C. Interior Door Frames, Non-Rated: .
   1. Frame Type: Full profile/continuously welded type.
   2. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
      d. Zinc Coating: Manufacturer's standard coating thickness; ASTM A653/A653M

D. Interior Door Frames, Fire-Rated:
   1. Frame Type: Full profile/continuously welded type.
   2. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
      a. Level 3 - Extra Heavy-duty.
      b. Physical Performance Level C, 250,000 cycles; in accordance with ANSI/SDI A250.4.
      c. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
      d. Zinc Coating: Manufacturer's standard coating thickness; ASTM A653/A653M.
   3. Fire Rating: As indicated on the "Door Schedule", tested in accordance with UL 10C or NFPA 252 ("positive pressure fire tests").
   4. Provide smoke gaskets.
   5. Provide units listed and labeled by ITS (DIR) or UL (DIR).
      a. Attach fire rating label to each fire rated unit.

2.04 FRAME ANCHORS

A. Stud-Wall Type: Designed to engage stud, welded to the back of frames; not less than 0.042 inches (1.0 mm) thick. Provide the number and spacing of anchors as follows:
   1. Locate anchors not more than 18 inches (457 mm) from the top and bottom of the frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      a. Three anchors per jamb up to 60 inches (1524 mm) high.
      b. Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      c. Two anchors per head for frames above 42 inches (1066 mm) wide

B. Floor Anchors: Formed from the same material as frames, not less than 0.042 inches (1.0 mm) thick, and as follows:
   1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

C. All anchors in exterior walls shall be hot-dip galvanized with non-corrosive anchors.

2.05 FINISH

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10.

2.06 ACCESSORIES

A. Silencers: Resilient rubber, fitted into drilled hole; (3) on the strike side of a single door, (3) on the center mullion of pairs, and (2) on the head of pairs without center mullions.

B. Removable Stops for Glazed Frames: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.

2.07 FABRICATION

A. Fabricate metalwork to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with a minimum radius for the thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at the Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate metalwork to tolerances indicated in SDI 117.

C. Factory-welded 3-sided frames:
   1. Frame Type: Full profile/continuously welded type.
      a. Description: Continuous or full profile welded frames require face and back welding of butted or miter joints.
   2. Profile: 2-inch (51 mm) face dimension with 5/8 inch (16 mm) high stop, and types and throat dimensions indicated on the Door Schedule.
   3. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.
   4. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
   5. Grout Guards: Weld guards to frame at the back of hardware mortises in frames to be grouted.
   6. Floor Anchors: Weld anchors to the bottom of jambs and mullions with at least four spot welds per anchor.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install frames in accordance with manufacturer's instructions and related requirements of specified frame standards or custom guidelines indicated.

B. Install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction.

D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Install door hardware as specified in Section 08 71 00.

F. Coordinate installation of electrical connections to electrical hardware items.

G. Touch up damaged factory finishes.

H. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

3.04 SCHEDULE

A. Refer to the "Door Schedule" on the drawings.

END OF SECTION 08 12 13

SECTION 08 14 16
FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flush wood veneer doors; flush configuration; fire-rated, non-rated, and special function.

1.02 RELATED REQUIREMENTS

A. Section 08 12 13 - Metal Frames for Wood Doors.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

1.03 REFERENCE STANDARDS

A. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

B. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2022.

C. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2025.

D. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.

E. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

D. Samples: Submit two samples of door veneer, 4 inch in size illustrating wood grain, stain color, and sheen.

E. Warranty, executed in Owner's name.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than (3) years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.07 WARRANTY

A. See Section 013300, for additional warranty requirements.

B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
   1. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Wood Veneer Faced Doors:
   1. Eggers Industries: www.eggersindustries.com/#sle.

2. Graham Wood Doors: www.grahamdoors.com/#sle.
3. Marshfield DoorSystems, Inc: www.marshfielddoors.com/#sle.
4. V.T. Industries (VTI); www.vti.com

2.02 DOORS

A. Doors: Refer to drawings for locations and additional requirements.
   1. High Pressure Decorative Laminate (HPDL) Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at each location.
   2. Fire-Rated Doors: Tested to ratings indicated on drawings in accordance with UL 10C - Positive Pressure; Underwriters Laboratories Inc (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
   3. Smoke- and Draft-Control Doors: In addition to the required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch wg pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.

2.03 DOOR CORES

A. Non-Rated Solid Core and 20-Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire-Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.04 DOOR FACINGS

A. High Pressure Decorative Laminate (HPDL) Facing for Doors: NEMA LD 3, SGF; color(s) as indicated; As indicated in finish schedule..

2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores constructed with stiles and rails:

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

2.06 FACTORY FINISHING

A. Factory finish doors in accordance with approved sample.

B. Seal door top edge with color sealer to match door facing.

2.07 ACCESSORIES

A. Hollow Metal Door Frames: As specified in Section 08 12 13.

B. Glazed Openings in Doors:
   1. Glazing Type GL-1: Refer to Section 08 80 00 - Glazing.

C. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style tamper-proof screws.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions, and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.
   2. Install smoke- and draft-control doors in accordance with NFPA 105 requirements.

B. Use machine tools to cut or drill for hardware.

C. Coordinate installation of doors with installation of frames and hardware.

D. Coordinate installation of glazing.

3.03 TOLERANCES

A. Conform to specified quality standard for fit and clearance tolerances.

B. Conform to specified quality standard for telegraphing, warp, and squareness.

3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

3.05 SCHEDULE

A. Refer to Door and Frame Schedule appended to this section.

END OF SECTION 08 14 16

SECTION 08 33 00.13
FEMA TORNADO PROTECTION OVERHEAD ROLLING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electric operated, automatic closing, overhead rolling doors, fire doors

1.02 RELATED REQUIREMENTS

A. 05 50 00 - Metal Fabrications

B. 06 10 00 - Rough Carpentry

C. 08 72 00 - Door Hardware

D. Division 26. Electrical wiring and conduit, fuses, disconnect switches, connection of operator to power supply, installation of control station and wiring, and connection to alarm systems.

1.03 SYSTEM DESCRIPTION

A. Certifications:
   1. Provide certification of compliance with ICC 500-2014 ICC/NSSA Standard for the Design and Construction of Storm Shelters
   2. Provide certification of compliance with FEMA 361 Safe Rooms for Tornados and Hurricanes
   3. Provide certification of compliance to sustain 300 psf wind pressure in accordance with ASTM E330.
   4. Provide certification of compliance in accordance with the requirements of ASTM E1886 Large Missile Impact for FEMA 361 assemblies.

B. Performance Requirements:
   1. Provide doors with Underwriters' Laboratories, Inc. label for the fire rating classification
   2. Provide doors with Underwriters' Laboratories, Inc. label for “Leakage Rated Assembly” or “S” label demonstrating product tested to UL 1784
      a. Comply with NFPA 105 air leakage requirements
   3. Provide doors with labels displaying compliance to FEMA361 Safe Rooms for Tornados and Hurricanes and ICC500 requirements.

1.04 DESIGN REQUIREMENTS

A. Wind Loading:
   1. Supply doors to withstand at least 250 psf (11970 Pa) design wind load (tornado) (300 psf test pressure at 1.2 times the design wind load)

B. Cycle Life:
   1. Construction for the usage of up to 20,000 cycles for the life of the product

1.05 SUBMITTALS

A. Reference Section 01 33 00 - Submittal Procedures; submit the following items:

B. Product Data

C. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.

D. Certifications
   1. Provide certification of compliance with ICC 500-2014 ICC/NSSA Standard for the Design and Construction of Storm Shelters
   2. Provide certification of compliance with FEMA 361 Safe Rooms for Tornados and Hurricanes
   3. Provide certification of compliance to sustain 300 psf wind pressure in accordance with ASTM E330.

4. Provide certification of compliance in accordance with the requirements of ASTM E1886 Large Missile Impact for FEMA 361 assemblies.

E. Manufacturer's installation instructions.

F. Closeout Submittals:
   1. Operation and Maintenance Manual
   2. A certificate stating that installed materials comply with this specification
   3. Warranty Statement

G. QUALITY ASSURANCE
   1. Qualifications:
      a. Manufacturer Qualifications: ISO 9001:2015 registered and a minimum of five years experience in producing fire and smoke control units of the type specified.

1.06 DELIVERY, STORAGE & HANDLING

A. Follow manufacturer's instructions.

1.07 WARRANTY

A. Standard Warranty: Two years from the Date of Substantial Completion against defects in material and workmanship.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Cornell
   1. Products of other manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
      a. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”

2.02 BASIS OF DESIGN

A. Product: Cornell; Model #PRSD361

2.03 COMPONENTS

A. Curtain
   1. Material:
      a. Steel: Minimum 12 gauge, ASTM A1008 or ASTM A1011 grade 40 steel
   2. Finish:
      a. SpectraShield® Coating System

B. Endlocks
   1. Retention groove integrated into the body of the slat used to retain the slats within the guides.
   2. 16 gauge aluminum secured with tabs integrated into the body of the slat used to restrain the slats in a horizontal position relative to one another.

C. Bottom Bar
   1. Configuration:
      a. 12-gauge formed bottom bar profile with steel strengthening insert
   2. Finish:
      a. SpectraShield® Coating System

D. Guides
   1. Fabrication
      a. Minimum 1/4 inch (6.35mm) structural steel; Top of inner and outer guide shapes to be flared outwards to form bellmouth for smooth entry of curtain into guides. Top 16-1/2 inches (419.10 mm) of coil side guide shapes to be removable for ease of curtain installation and as needed for future curtain service.

2. Finish:
    a. SpectraShield® Coating System

E. Counterbalance Shaft Assembly
1. Barrel: Steel pipe capable of supporting curtain load with a maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width
2. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of the door.
3. Provide tension wheel for applying and adjusting spring torque.

F. Brackets
1. Fabricate from minimum 3/8 inch (9.525 mm) steel plate with permanently lubricated ball or roller bearings at rotating support points to support counterbalance shaft assembly and form end closures
2. Finish:
    a. SpectraShield® Coating System

G. Hood
1. Minimum 24 gauge galvanized steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets
2. Finish:
    a. SpectraShield® Coating System

H. Combination Weather / Smoke Seals
1. Bottom Bar:
    a. Manually Operated Doors: Two, replaceable, UL listed, brush smoke seals
    b. Motor Operated Doors: Combination smoke seal/sensing edge
2. Guides and Head: Replaceable, UL listed, brush smoke seals sealing against fascia side of the curtain

2.04 OPERATION

1. Motor Operation:
    a. AlarmGard Motor Operation: UL, cUL listed NEMA 1 enclosure, horsepower as recommended by manufacturer, [115v single] [230v single] [208/230v three] [460v three] phase service. Provide an enclosed non-ventilated motor, removable without affecting the setting of limit switches; thermal overload protection, planetary gear reduction, adjustable rotary limit switch mechanism, and a transformer with 24v secondary output. All internal electrical components are to be prewired to terminal blocks.
        1) Provide a failsafe motor operated door assembly requiring no ancillary or externally mounted release devices, cables, chains, pulleys, reset handles, or mechanisms
        2) Provide an internal electrical failsafe release device that requires no additional wiring, external cables, or mounting locations.
        3) Provide an internal solenoid brake mechanism to hold the door at any position during normal door operation.
        4) Provide logic for [1] [2] [3] fully monitored safety reversing devices such that the failure of any single monitored device will cause the motor operator to automatically revert to constant pressure to close.
        5) Electrically activate door system automatic closure by [notification from central alarm system] [manual guarded station operation] or [extended power outage exceeding four hours].
        6) Provide an automatic alarm closure selectable time delay of zero or ten seconds.
        7) Maintain automatic closure speed at not more than 9” (229 mm) per second.
        8) Provide an integral, non-resettable cycle counter.
        9) Install system only with manufacturer supplied or specified fasteners.

10) Electrically reset internal failsafe release device and door operating system upon restoration of electrical power and upon clearing of the alarm signal without requiring human interaction.
11) Provide selectable ability for the door system to automatically self-cycle to the fully open position following automatic reset without requiring human interaction.
12) Provide an integral, non-resettable cycle counter.
13) Ensure that manual resetting of spring tension, release devices, linkages, or mechanical dropouts will not be required.
14) Provide minimum #50 roller chain for drive connection from motor drive assembly to the door drive shaft.
15) Install system only with manufacturer supplied or specified fasteners.
16) Notify electrical contractor to mount control station(s) and supply the appropriate disconnect switch, all conduit, and wiring per the door system wiring instructions.
17) Test door system no less than twice annually to ensure full compliance with intended functions.

2. Sensing/Smoke Seal Edge:
   a. Electric sensing edge device: Automatic sensing switch within neoprene or rubber astragal extending the full width of door bottom bar. Contact before the door fully closes shall cause the door to immediately stop downward travel and automatically reverse direction to the fully opened position. Provide a wireless sensing edge connection to motor operator eliminating the need for a physical traveling electric cord connection between bottom bar sensing edge device and motor operator.

2.05 ACCESSORIES

1. Emergency Annunciator:
   a. ADA compliant horn/strobe] [Voice Warning Module] emergency annunciator to give advanced warning that door is about to close, activating warning signal upon alarm or activation.
2. Battery Back-Up:
   a. Model R-BBU Battery Back-Up System for AlarmGard Motor Operator:
      1) Prevent gravity closure for a minimum of four hours due to power failure.
3. Operator and Full Bracket Mechanism Cover:
   a. Provide a minimum 24 gauge sheet metal cover at the coil area of the unit. Finish to match door hood.

2.06 FINISHES

A. GalvaNex™ Coating System:
   1. ASTM A 653 galvanized base coating treated with dual-process rinsing agents in preparation for chemical bonding baked-on base coat and [gray] [tan] [white] [brown] baked-on polyester enamel finish coat

B. SpectraShield® Coating System:
   1. Zirconium pre-treatment followed by a baked-on polyester powder coat, with color as selected by Architect from manufacturer's standard color range; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better

C. Atmoshield® Powder Coating System (Color Selected by Architect):
   1. ASTM A 653 galvanized base coating treated with dual-process rinsing agents in preparation for chemical bonding, gray baked-on base coat, and gray baked-on polyester finish coat
   2. Zirconium pre-treatment followed by a baked-on polyester powder coat, with [weathered iron, weathered brown, earth, weathered bronze, terra cotta, stucco, platinum, olde copper, rust, dark roast, weathered copper]; minimum 2.5 mils (0.065 mm) cured film thickness; ASTM D-3363 pencil hardness: H or better

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings.

B. Coordinate with the responsible entity to perform corrective work on unsatisfactory substrates.

C. Commencement of work by the installer is acceptance of substrate.

3.02 INSTALLATION

A. General: Install door and operating equipment with necessary hardware, anchors, inserts, hangers, and supports.

B. Comply with NFPA 80 and NFPA 105 (fire-rated units), and follow the manufacturer's installation instructions.

3.03 ADJUSTING

A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion.

3.04 FIELD QUALITY CONTROL

A. Site Test: Test doors for normal operation and automatic closing.

3.05 CLEANING

A. Clean surfaces soiled by work as recommended by the manufacturer.

B. Remove surplus materials and debris from the site.

3.06 DEMONSTRATION

A. Demonstrate proper operation, testing, and reset procedures to the Owner's Representative.

B. Instruct Owner's Representative in maintenance procedures.

END OF SECTION 08 33 00.13

SECTION 08 33 13
COILING COUNTER DOORS

PART 1 GENERAL

1.01 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ITS (DIR) - Directory of Listed Products; Current Edition.

C. NEMA MG 00001 - Motors and Generators; 2024.

D. UL (DIR) - Online Certifications Directory; Current Edition.

1.02 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Coiling Counter Doors:
   1. Alpine Overhead Doors, Inc; Counter Shutter - Rolling Shutters: www.alpinedoors.com/#sle.
   2. C.H.I. Overhead Doors; Model 6522 (steel): www.chiohd.com/#sle.
   3. Raynor Garage Doors; DuraShutter, Model ___: www.raynor.com/#sle.

2.02 COILING COUNTER DOORS

A. Coiling Counter Metal Doors, Non-Fire-Rated: Galvanized steel slat curtain.
   1. Mounting: Interior face mounted.
   2. Nominal Slat Size: 1-1/4 inches wide.
   3. Slat Profile: Flat, perforated.
   4. Finish, Galvanized Steel: Factory baked enamel.
   5. Color: As indicated on drawings.
   6. Guides: Formed track; same material and finish unless otherwise indicated.
   7. Hood Enclosure: Manufacturer's standard; primed steel.
   8. Electric operation.
   9. Locking Devices: Slide bolt on inside.

2.03 COMPONENTS

A. Metal Curtain Construction: Interlocking, single-thickness slats.
   1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
   2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
   3. Steel Slats: ASTM A653/A653M galvanized steel sheet, with minimum G90/Z275 coating; minimum thickness 16 gauge, 0.06 inch.

B. Guide Construction: Continuous, of profile to retain door in place, with mounting brackets of same metal.

C. Hood Enclosure: Internally reinforced to maintain rigidity and shape.

D. Lock Hardware:

1. For motor operated units, additional lock or latching mechanisms are not required.
2. Slide Bolt: Provide on single-jamb side, extending into slot in guides, with padlock on one side.

E. Roller Shaft Counterbalance: Steel pipe and torsion steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.04 ELECTRIC OPERATION

A. Operator, Controls, Actuators, and Safeties: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction (AHJ) as suitable for purpose specified and indicated.
1. Provide interlock switches on motor operated units.

B. Electric Operators:
1. Mounting: Side mounted.
2. Motor Enclosure: NEMA MG 00001.
3. Motor Rating: As recommended by manufacturer; continuous duty.
4. Motor Voltage: 110-120 VAC, single phase, 60 Hz.
5. Opening Speed: 6 inches per second.
6. Manual override in case of power failure.

C. Control Station: Standard three button (OPEN-STOP-CLOSE) momentary control for each electrical operator.
1. Controls: 24 VAC circuit.
2. Surface mounted.

D. Safety Edge: Located at bottom of curtain, full width, electro-mechanical sensitized type, wired to stop operator upon striking object, hollow neoprene covered.

END OF SECTION 08 33 13

SECTION 08 33 23
OVERHEAD COILING DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Motor Operated automatic closing service doors.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications

1.03 REFERENCE STANDARDS

A. UL 1784 - Standard for Air Leakage Tests of Door Assemblies and Other Opening Protectives; Current Edition, Including All Revisions.

1.04 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Provide doors with Underwriters' Laboratories, Inc. label for the fire rating classification, 1 1/2-hour.

C. Provide doors with Underwriters' Laboratories, Inc. label for "Leakage Rated Assembly" or "S" label.
   1. Comply with NFPA 105 air leakage requirements.
   2. Pass UL 1784.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
   1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
   2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
   3. For fire-rated doors, description of fire-release system including testing and resetting instructions.

C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

PART 2 PRODUCTS

2.01 COILING DOORS

2.02 MATERIALS AND COMPONENTS

A. Metal Curtain Construction: Interlocking slats.
   1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
   2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.

END OF SECTION 08 33 23

SECTION 08 36 13
SECTIONAL OVERHEAD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Sectional overhead doors, motor operated.

B. Operating hardware and supports.

C. Electrical controls.

1.02 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications

B. Section 06 10 00 - Rough Carpentry

C. Section 08 71 00 - Door Hardware

D. Division 26 - Electrical

1.03 REFERENCE STANDARDS

A. ICC (IBC)-2018 - International Building Code; 2018.

B. NEMA EN 10250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2024.

C. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2008 (Reaffirmed 2020).

D. NEMA MG 00001 - Motors and Generators; 2024.

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

F. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. Delegated Design: Design sectional overhead doors, including comprehensive engineering analysis by a qualified professional engineer, using the design criteria specified below.
   1. General Design Criteria:
      a. Building Code: 2018 IBC.
      b. Structural Design Standard: See Structural Drawings
      c. Occupancy Risk Category: See Structural Drawings
   2. Wind-Resistance Design Criteria:
      a. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
      b. Ultimate Design Wind Speed, V_{ULT}: See Structural Drawings.
      c. Exposure Category: See Structural Drawings

B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.05 SUBMITTALS

A. Submit under the provisions of Section 01 33 00.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

F. Manufacturer's Installation Instructions: Include any special procedures required by project conditions.

G. Operation Data: Include normal operation, troubleshooting, and adjusting.

H. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.

I. Warranty: Submit manufacturer warranty and ensure forms have been completed in the Owner's name and registered with the manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

C. Comply with applicable code for motor and motor control requirements.

D. Products Requiring Electrical Connection: Listed and classified by ITS (DIR), UL (DIR), or testing firm acceptable to authorities having jurisdiction, as suitable for the purpose specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in the manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.08 WARRANTY

A. Manufacturer’s Warranty: Manufacturer’s limited door and operators system warranty for (10) years against delamination of polyurethane foam from steel face, and all other components for (3) years or 20,000 cycles, whichever comes first.
   1. Warranty periods begin at the Date of Substantial Completion.

B. Finish Warranty: Manufacturer warrants the powder coat finish on the door sections against fading, cracking, blistering, flaking, or peeling for (3) years from the Date of Substantial Completion.

C. Operator Warranty: Provide limited warranty on the operator motor and parts for (2) years (or 20,000 cycles) from the Date of Substantial Completion.

D. Installation Warranty: The installing subcontractor shall warrant the installation to be free of defects in material and workmanship for (1) year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Overhead Door Corporation.
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
      a. C.H.I. Overhead Doors.
      b. Clopay Building Products.
      c. Raynor Garage Doors.
      d. Wayne Dalton.
   2. Substitutions: See section 006325.

2.02 INSULATED SECTIONAL OVERHEAD DOORS

A. Basis of Design: Overhead Door; 596 Series, Thermacore Insulated Steel Doors.

1. Door Assembly: Sandwich panel construction, with PVC thermal break and weather-tight ship-lap design meeting joints.
    a. Panel Thickness: 2 inches (51 mm).
    b. Exterior Steel: 20 gauge, galvanized.
    c. Exterior Surface: Flush, textured.
    d. End Stiles: 16 gauge with thermal break.
    e. Spring Counterbalance: Sized to the weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of diecast aluminum with high strength galvanized aircraft cable. Sized with a minimum of 7 to 1 safety factor.
        1) Standard cycle spring: 10,000 cycles.
    f. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
    g. Thermal Values (R-value / U-Value): R-17.40; U-0.057.
    h. Air Infiltration: 0.08 cfm at 15 mph; 0.08 cfm at 25 mph.
    i. Sound Transmission: Class 26.
    j. Thermal Break: PVC.
2. Finish and Color:
    a. Two coat baked-on polyester:
        1) Exterior Color: To be selected by Architect from manufacturers product line
        2) Interior Color: White
3. Hardware: Galvanized steel hinges and fixtures. Ball-bearing rollers with hardened steel races.
4. Lock:
    a. Interior mounted slide lock with interlock switch for the automatic operator.
5. Weatherstripping:
    a. EPDM bulb-type strip at the bottom section.
    b. Flexible Jamb seals.
    c. Flexible Header seal.
6. Track: Provide track as recommended by the manufacturer to suit loading required and clearances available.
    a. Type:
        1) High lift.
7. Electric Motor Operation: Provide UL listed electric operator, size, and type as recommended by the manufacturer to move the door in either direction at not less than 2/3 foot or more than 1 foot per second. The operator shall meet UL325/2010 requirements for continuous monitoring of safety devices.
    a. Entrapment Protection: Required for momentary contact, includes radio control operation.
        1) Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
        2) Electric sensing edge monitored to meet UL 325/2010.
        3) Photoelectric sensors monitored to meet UL 325/2010.
    b. Operator Controls:
        1) Push-button-operated control stations with open, close, and stop buttons.
        2) Surface mounting.
        3) Interior location.

2.03 ELECTRIC OPERATORS

A. Operator, Controls, Actuators, and Safeties: Comply with UL 325; provide products listed by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
    1. Provide interlock switches on motor-operated units.
    2. Provide tamperproof operation cycle counter.

B. Electric Operators:

1. Mounting: Side mounted on cross head shaft.
2. Motor Enclosure:
    a. Exterior Doors: NEMA MG 00001, Type 4; open drip proof.
3. Motor Rating: 1/3 hp; continuous duty.
4. Motor Voltage: 120 volts, single phase, 60 Hz.
5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
6. Controller Enclosure: NEMA EN 10250, Type 1.
7. Opening Speed: 12 inches per second, maximum.
8. Brake: Adjustable friction clutch-type, activated by the motor controller.
9. Manual override in case of power failure.

C. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in a terminal box sized to comply with NFPA 70.

D. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
1. 24 volt circuit.
2. Surface mounted, at interior door jamb.
3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    a. Primary Device: Provide NEMA 1 photo eye sensors as required with a momentary-contact control device.

E. Safety Edge: Located at bottom of the sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.

F. Provide loop detector and treadle.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor barrier seal.

3.03 INSTALLATION

A. Install door unit assembly in accordance with manufacturer's instructions.

B. Anchor assembly to wall construction and building framing without distortion or stress.

C. Securely brace door tracks suspended from the structure. Secure tracks to structural members only.

D. Fit and align door assembly including hardware.

E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

F. Install perimeter trim.

3.04 ADJUSTING

A. Adjust door assembly for smooth operation and full contact with weatherstripping.

B. Have manufacturer's field representative present to confirm proper operation and identify adjustments to a door assembly for the specified operation.

3.05 CLEANING

A. Clean doors and frames.

B. Remove temporary labels and visible markings.

3.06 PROTECTION

A. Protect installed products from damage until the Date of Substantial Completion.

B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION 08 36 13

SECTION 08 43 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Exterior aluminum storefront framing.

B. Interior aluminum storefront framing.

C. Entrance doors and frames, interior and exterior.

1.03 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-In-Place Concrete

B. Section 05 40 00 - Cold-Formed Metal Framing

C. Section 06 10 00 - Rough Carpentry

D. Section 08 80 00 - Glazing

E. Section 09 21 16 - Gypsum Board Assemblies

1.04 DESIGN AND PERFORMANCE REQUIREMENTS

A. Product to comply with the specified performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction, as determined by testing of aluminum storefront systems representing those indicated for this project.

B. Aluminum storefront systems shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

C. Failure includes any of these events:
   1. Thermal stresses transferring to the building structure.
   2. Glass breakage.
   3. Loosening or weakening of fasteners, attachments, and other components.

D. Delegated Design: Design aluminum storefronts and entrance doors, including comprehensive engineering analysis by a qualified professional engineer, using the design criteria specified below.
   1. General Design Criteria:
      a. Building Code: 2018 IBC.
      b. Structural Design Standard: See Structural Drawings
      c. Occupancy Risk Category: See Structural Drawings
   2. Seismic Design Criteria:
      a. Seismic Design Category: Category B.
      b. Site Class: [Global - Soil Class] - Stiff Soil
   3. Wind-Resistance Design Criteria:
      a. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
      b. Ultimate Design Wind Speed, V_{ULT}: See Structural Drawings.
      c. Exposure Category: See Structural Drawings
      d. Nominal Design Wind Speed, V_{ASD}: See Structural Drawings.

E. Performance Testing:

1. Air Infiltration Test: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E283, at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
2. Water Resistance Test (ASTM E331): There shall be no uncontrolled water leakage at a static minimum static air pressure differential of 10.0 psf (479 Pa)
3. Condensation Resistance Factor - CRF (AAMA 1503): Not less than 71 (frame) and 68 (low-e glass)
4. Thermal Transmittance (AAMA 1503): U-factor of not more than 0.41 Btu/sf^2/^{o}F (3.23 W/sq. m x K) with Low-e glass.
5. Sound Transmission (AAMA 1801):
   a. Sound Transmission Class (STC): 31 STC (minimum)
   b. Outdoor-Indoor Transmission Class (OITC): Minimum 25 OITC.

F. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.05 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.

B. Shop Drawings: For aluminum-framed systems.
1. Storefront Framing Systems: Include plans, elevations, sections, details, and attachments to other work. Include details of provisions for system expansion and contraction and drainage of moisture in the system to the exterior.
2. 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. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

C. 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. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

D. Finish Samples:
1. For Initial Selection: For units with factory-applied color finishes.
2. For Verification: For each type of exposed finish required, in manufacturer's standard sizes.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer and testing agency.

B. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from the manufacturer.
1. The Basis for Certification: Indicate whether withstand certification is based on the actual test of assembled components or calculation.

C. Welding certificates

D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

E. Source quality-control reports.

F. Field quality-control reports.

G. Warranty samples

1.07 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed systems and entrance doors to include in maintenance manuals.

1.08 QUALITY ASSURANCE

A. Test reports shall be accompanied by the storefront manufacturer’s letter of certification stating that the tested storefront meets or exceeds the requirements of the

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

C. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.

D. 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.

E. Product Options: Information on Drawings and 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 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.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

F. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

G. Source Limitations for Aluminum-Framed Systems: Obtain from a single source from a single manufacturer.

H. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.09 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Installation Warranty: The installation contractor shall warrant the installation to be free of defects in material and workmanship for (1) year from the Date of Substantial Completion.

B. Special Manufacturer Extended Warranty: The manufacturer shall warrant the products, including aluminum finish, to be free of defects in material and workmanship for (3) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Kawneer Corporation
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
      a. Tubelite
      b. EFCO Corporation
      c. Manko Window Systems, Inc
      d. Special-Lite
   2. Substitutions: See section 006325.

2.02 MATERIALS

A. Aluminum Extrusions (ASTM B221): Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish, and not less than 0.070-inch (min.) wall thickness

B. Thermal Barrier: All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. The barrier material shall be poured-in-place, two-part polyurethane. A nonstructural thermal barrier is unacceptable.

C. Glazing: Refer to Section 08 80 00

D. Glazing Gaskets: Manufacturer's standard compression types; replaceable, extruded EPDM rubber.

E. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

F. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

G. Glazing Sealants: For structural-sealant-glazed systems, as recommended by the manufacturer for joint type, and as follows:
   1. Structural Sealant: ASTM C1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as a structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
      a. Color: Black
   2. Weatherseal Sealant: ASTM C920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; A single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weather seal-sealant, and aluminum-framed-system manufacturers for this use.
      a. Color: Matching structural sealant.

H. Fasteners: Aluminum, non-magnetic stainless steel, or other materials to be non-corrosive and compatible with aluminum framing members, trim hardware, anchors, and other components.

I. Anchors, Clips, and Accessories: Aluminum, non-magnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coatings; provide sufficient strength to withstand design pressure indicated.

J. Reinforcing Members: Aluminum, non-magnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coatings; provide sufficient strength to withstand design pressure indicated.

K. Concealed Flashing: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A240/A240M of type recommended by manufacturer.

L. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

2.03 EXTERIOR ALUMINUM STOREFRONT SYSTEMS

A. Storefront Framing at Entrance Doors:
   1. Product: Kawneer; Tri-Fab 451UT, Thermally broken storefront system.
      a. Framing Member: Manufacturer's standard extruded-aluminum framing members of thickness required, and reinforced as required to support imposed loads
         1) Framing Depth: 4-1/2 inches (114 mm).
         2) Face Dimension: 2 inches (50 mm).
      b. Construction: Frame components shall be screw spline construction.
      c. Glazing Plane: Center plane
      d. Glazing System: Retained mechanically with gaskets on four sides

B. Storefront Framing for Exterior Window Applications, Type 1 :

1. Product (Standard): Kawneer; Tri-Fab VG 451T, Thermally broken storefront system.
    a. Framing Member: Manufacturer's standard extruded-aluminum framing members of thickness required, and reinforced as required to support imposed loads
        1) Standard Framing Depth: 4-1/2 inches (114 mm) unless indicated otherwise.
        2) Face Dimension: 2 inches (50 mm).
    b. Construction: Frame components shall be shear block construction.
    c. Glazing Plane: Exterior plane.
    d. Glazing System: Retained mechanically with gaskets on four sides

C. Storefront Framing for Exterior Window Applications, Type 2 :
1. Product: Kawneer; VG 601T, Thermally broken storefront system.
    a. Framing Member: Manufacturer's standard extruded-aluminum framing members of thickness required, and reinforced as required to support imposed loads
        1) Framing Depth: 6 inches (150 mm) where indicated in the Drawings.
        2) Face Dimension: 2 inches (50 mm).
    b. Construction: Frame components shall be shear block construction.
    c. Glazing Plane: Exterior plane.
    d. Glazing System: Retained mechanically with gaskets on four sides

2.04 INTERIOR ALUMINUM STOREFRONT SYSTEM

A. Product: Kawneer; Tri-Fab VG 450, Non-Thermal storefront system.
1. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
    a. Framing Depth: 4-1/2 inches (114 mm).
    b. Framing Face Width: 1-3/4 inches (45 mm).
2. Construction: Frame components shall be shear block construction.
3. Glazing Plane: Center
4. Glazing System: Retained mechanically with gaskets on four sides.

2.05 ALUMINUM ENTRANCE DOORS

A. Exterior Entrance Doors: Manufacturer's glazed full-lite entrance doors, manual-swing operation.
1. Product: Kawneer; Series 500T Insulpour Thermal Entrances, wide stiles.

B. Physical Properties:
1. Overall Door Thickness: 1-3/4 inches
2. Material Thickness: 0.125-inches minimum extruded aluminum
3. Wide Stile Doors:
    a. Vertical Stiles: 5-inches wide.
    b. Top Rail: 5-inches high
    c. Bottom Rail: 10-inches high
    d. Intermediate Rail for mounting of panic hardware: 8-1/4 inches high.
4. Glazing Stops and Gaskets: Square, extruded aluminum stops shaped to accommodate 1/4-inch or 1-inch glazing with the manufacturer’s standard glazing gaskets.
    a. Provide non-removable glazing stops at the exterior side of doors and storefronts.

C. Door Hardware: Refer to Section 08 71 00.

D. Performance:
1. Opening-Force Requirements:
    a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open the door.

2.06 FINISHES

A. Kawneer Permanodic™ AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating.
   1. Color: #29 Black

2.07 FABRICATION

A. General
   1. All exposed work shall be carefully matched to produce continuity of line and design with all joints. System design shall be such that raw edges will not be visible at joints.

B. Storefront Framing:
   1. Exterior Framing:
      a. Frame components shall be screw spline construction at entrance door locations, and shear block construction at exterior window locations
   2. Fabricate components that, when assembled, have the following characteristics:
      a. Profiles that are sharp, straight, and free of defects or deformations.
      b. Accurately fitted joints with ends coped or mitered.
      c. The means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
      d. Physical and thermal isolation of glazing from framing members.
      e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
      f. Provisions for field replacement of glazing from the interior for vision glass, and from the exterior for spandrel glazing (or metal panels)
      g. Fasteners, anchors, and connection devices that are concealed from view to the greatest extent possible.
   3. Structural-Sealant-Glazed Framing Members: Include accommodations for using a temporary support device to retain glazing in place while structural sealant cures.

C. Entrance Doors:
   1. Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
      a. Exterior Doors: Provide compression weather stripping at fixed stops.
   2. Doors: Reinforce doors as required for installing entrance door hardware.
      a. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into the door edge.
      b. At exterior doors, provide weather sweeps applied to door bottoms.
   3. 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.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting the performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 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 the manufacturer for this purpose.

C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to the exterior.

D. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 - Submittal Procedures 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 Section 08 80 00.

G. Install perimeter joint sealants as specified in Section 07 92 00 to produce weathertight installation.

3.03 ERECTION TOLERANCES

A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
2. Alignment:
a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).

B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

3.04 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide periodic site visits by the manufacturer’s field service representative.

B. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

C. Additional testing and inspecting, at the Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

D. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.

3.05 ADJUSTING, CLEANING, AND PROTECTION

A. Adjust operating entrance door hardware to function smoothly as recommended by the manufacturer.

B. Clean aluminum surfaces immediately after installing aluminum-framed entrance doors. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

C. Clean glass immediately after installation. Comply with glass manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.

E. Protect installed systems from damage.

END OF SECTION 08 43 13

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Furnish and install architectural aluminum curtain wall complete with related components as shown on drawings and specified in this section.

1.03 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications

B. Section 06 10 00 - Rough Carpentry

C. Section 08 80 00 - Glazing

D. Section 09 21 16 - Gypsum Board Assemblies

1.04 REFERENCE STANDARDS

A. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2015.

B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.

C. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site; 2015.

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

E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

G. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017 (Reapproved 2022).

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

I. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2026).

J. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004 (Reapproved 2012).

K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

1.05 DESIGN AND PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

B. Delegated Design: Design aluminum storefronts and entrance doors, including comprehensive engineering analysis by a qualified professional engineer, using the design criteria specified below.

1. General Design Criteria:
    a. Building Code: 2018 IBC.

b. Structural Design Standard: See Structural Drawings
c. Occupancy Risk Category: See Structural Drawings

2. Seismic Design Criteria:
   a. Seismic Design Category: Category B.
   b. Site Class: [Global - Soil Class] - Stiff Soil
3. Wind-Resistance Design Criteria:
   a. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
   b. Ultimate Design Wind Speed, V_{ULT}: See Structural Drawings.
   c. Exposure Category: See Structural Drawings
   d. Nominal Design Wind Speed, V_{ASD}: See Structural Drawings.

C. Provide a water test to certify that the curtainwall systems installation meets the performance criteria established by the manufacturer of the system.

D. Air Infiltration: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.24 psf pressure differential across assembly.

E. Uniform Load Deflection Test
1. Test in accordance with ASTM E330/E330M.
2. Member deflection for spans less than 13 feet 6 inches: Limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch, whichever is less and with full recovery of glazing materials.
3. Member deflection for spans over 13 feet 6 inches and less than 40 feet: Limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch, with full recovery of glazing materials.

1.06 SUBMITTALS

A. 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. Detail fabrication and assembly of aluminum-framed systems.
2. Include design calculations.

B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing , and infill.

C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details, and field welding required.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

G. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

H. Field Quality Control Submittals: Report of field testing for water leakage.

I. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.

1.07 QUALITY ASSURANCE

A. Test reports shall be accompanied by the curtainwall manufacturer’s letter of certification stating that the tested framing system meets or exceeds the requirements of the 2015 IECC.

B. Delegated Design: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Iowa.

C. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with not less than three years of documented experience.

D. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

E. 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.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.

1.08 MOCK-UP

A. Mock-up shall include each component being used on the project. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.

B. Locate mock-up where directed by Architect. Mock-up may remain as part of the Work.

C. Have a specimen representative of project conditions tested by an independent testing agency for compliance with specified thermal, structural, air infiltration, water penetration, and sound attenuation criteria.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 WARRANTY

A. Anodized Finish Warranty: Manufacturer shall warrant the Class I anodized finish for (5) years from the Date of Substantial Completion and under the following conditions:
   1. The finished Metal will not change color more than five (5) DEcmc as determined per AAMA 611.
   2. The finished Metal will not crack, blister, check or peel.

B. Painted Finish Warranty: Manufacturer shall warrant the painted finish for (10) years from the Date of Substantial Completion against color change, chalk and fade, and film integrity.

C. Manufacturer Warranty: Manufacturer shall warrant the product/s to be free of defects in material and workmanship for (2) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Kawneer Corporation
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
      a. Tubelite
      b. EFCO Corporation
      c. Manko Window Systems, Inc.
      d. C.R. Laurence Company, Inc. (U.S. Aluminum).
      e. Oldcastle Building Envelope.
      f. Pittco Architectural Metals Inc.
      g. Wausau Window and Wall Systems.
      h. Trulite Glass & Aluminum Solutions, LLC.
   2. Substitutions: See section 006325.

2.02 GLAZED ALUMINUM CURTAIN WALL SYSTEM

A. Product: Kawneer; 1600 Wall System™1, with vertical butt glazing. Frames to receive 1” thick glazing.

B. Product: Kawneer; 1600 Wall System™1.
   1. System Description: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

C. Curtainwall Framing:
   1. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
      a. Glazing System: 4-sided captured.
      b. Glazing Plane: Front.
      c. System Cross-Section Dimension: 2-1/2 inches wide by 7-1/2 inches deep.
      d. Finish: Class I color anodized.
   2. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
   3. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as recommended by sealant manufacturer.
   4. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.
   5. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.
   6. Furnish and install prefabricated aluminum pan flashing system with ends and back turned up 1/2-inch Pan shall match color of aluminum framing system and extend out to drain as detailed and required, with drip, set in full beads of sealant.

D. Glass:
   1. Glazing Method: Field glazed system.
   2. Glazing Configuration:
      a. Outside glazed, with pressure plate and mullion cover.
   3. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   4. Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.

2.03 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" (1.78) wall thickness at any location for the main frame and complying with ASTM B221: 6063-T6 alloy and temper.

B. Sheet Aluminum: Shall meet the requirements of ASTM B209 (ASTM B209M).

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.

F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

G. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

H. Thermal Barrier: Thermal separator shall be extruded of a silicone compatible elastomer that provides a minimum 1/4" (6.3) separation.

I. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

2.04 GLAZING

A. Glazing Types: Refer to Section 08 80 00 - Glazing, for glazing requirements.

B. Glazing Gaskets: Gaskets to meet the requirements of ASTM C864.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: As recommended by manufacturer for joint type.

2.05 ACCESSORY MATERIALS

A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762 mm) thickness per coat.

2.06 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. 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.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from exterior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

7. Internal weeping system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.

C. Curtain Wall Framing: Fabricate components for assembly using shear block system following manufacturer's standard installation instructions.

D. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.07 FINISHES

A. All exposed framing surfaces shall be free of scratches and blemishes.

B. Factory Finishing:
   1. AA-M10C21A44 / AA-M45C22A44, AAMA 611, Architectural Class I Color Anodic Coating
      a. Color: Clear Annodized

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify dimensions, tolerances, and method of attachment with other related work.

B. Verify that curtain wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

A. General: Install curtain wall systems plumb, level, and true to line, without warp or rack of frames with manufacturer’s prescribed tolerances and installation instructions. Provide support and anchor in place.

B. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.

C. Glazing Installation:
   1. Pressure Plate Framing: Glass shall be outside glazed and held in place with extruded aluminum pressure plates anchored to the mullion using stainless steel fasteners spaced no greater than 9-inches (228.6) on-center.

D. Water Drainage: Each light of glass shall be compartmentalized using joint plugs and silicone sealant to divert water to the horizontal weep locations. Weep holes shall be located in the horizontal pressure plates and covers to divert water to the exterior of the building.

3.03 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. Provide services of manufacturer's field representative to observe installation and submit report.

B. Test installed curtain wall for water leakage in accordance with AAMA 501.2.

C. Replace curtain wall components that have failed field testing and retest until performance is satisfactory.

3.05 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.06 PROTECTION

A. Protect installed products from damage until the Date of Substantial Completion.

END OF SECTION 08 44 13

SECTION 08 56 53
SECURITY WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security transaction windows.

1.02 REFERENCE STANDARDS

A. SSPC-Paint 33 - Coal Tar Mastic Coating, Cold-Applied; 2023.

B. UL 752 - Standard for Bullet-Resisting Equipment; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

1.04 SUBMITTALS

A. Product Data: Manufacturer's published data showing materials, construction details, dimensions of components, and finishes.

B. Shop Drawings: Drawings prepared specifically for this project, showing plans, elevations, sections, details of construction, anchorage to other work, hardware, and glazing.
   1. For new work show required opening dimensions and allowance for field deviation.

C. Samples of Color Anodized Finishes: Frame member sections showing range of color to be expected in finished work.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Firm with at least 5 years experience in the manufacture of windows of the type specified and able to provide test reports showing that their standard manufactured products meet the specified requirements; custom designed products not acceptable.

B. Testing Agency Qualifications: Independent testing agency able to show experience in conducting tests of the type specified.

1.06 WARRANTY

A. See Section 013300 for additional warranty requirements.

B. Provide manufacturer's warranty agreeing to repair or replace windows and window components that fail within three years after Date of Substantial Completion due to, but not limited to, the following:
   1. Structural failure, failure of welds, and deterioration of metals and finishes beyond that expected under detention use and normal weathering.
   2. Failure of glazing due to excessive deflection of supporting members under wind load.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Security Transaction Windows:
   1. Quikserv; _____: www.quikserv.com/#sle.
   2. Substitutions: See section 006325.

B. Security Glazing:
   1. Sierracin Corporation; _____: www.sierracin.com/#sle.
   2. North America Specialty Glass; _____: www.naspecialtyglass.com/#sle.
   3. Viracon, Apogee Enterprises, Inc; _____: www.viracon.com/#sle.

C. Security Fasteners:
   1. Acument Global Technologies; _____: www.acument.com/#sle.
   2. Safety Socket Screw Corporation; _____: www.safetysocket.com/#sle.
   3. Tamperproof Screw Co, Inc; _____: www.tamperproof.com/#sle.
   4. Tamper-Pruf Screws, Inc; _____: www.tamper-pruf-screws.com/#sle.

D. Provide windows from a single manufacturer.

2.02 ASSEMBLIES

A. Security and Detention Windows:
   1. Dimensions, profiles, features, and performance specified and indicated on drawings are required; do not deviate unless specifically approved by Architect under substitution procedures.
   2. Design to fit openings indicated on drawings; design to accommodate deviation of actual construction from dimensions indicated on drawings.
   3. Fabricate frames and sash with corners mitered or coped full depth with concealed welded joints.
   4. Design anchorages to provide performance equivalent to that required for window unit; provide anchorages at least equivalent to those by which the tested units were anchored to the test frame.
   5. Separate dissimilar metals to prevent corrosion by galvanic action by painting contact surfaces with primer or with sealant or tape recommended by manufacturer for the purpose.
   6. Weld components before finishing and in concealed locations, to greatest extent possible; minimize distortion and discoloration of finish; remove residue of welding; grind exposed welds smooth and finish to match.
   7. Label units to indicate which side is which, such as inside/outside or secure/non-secure; use labels that are removable after installation but durable enough not to be lost during delivery, storage, handling, and installation.

2.03 SECURITY TRANSACTION WINDOWS

A. Security Transaction Windows:
   1. Location: Built within interior wall, as indicated on drawings.
   2. Type of Use: Walk-up.
   3. Ballistic Resistance: Tested to meet UL 752, Level 3.
   4. Window Type: Fixed.
      a. Mounting: Flush with the wall surface.
      b. Window Size: 48" inch wide by 48" inch high.
      c. Size of Counter Space: As indicated on drawings.
   5. Glazing: Single (monolithic), clear, and ballistic resistant.
      a. Laminated safety glazing.
   6. Products:
      a. Quikserv; _____ and built-in deal tray: www.quikserv.com/#sle.
      b. Ready Access; 503/603 .
      c. Substitutions: See section 006325.

2.04 ASSEMBLY COMPONENTS

A. Frame Anchors: Mild steel plates, shapes, or bars, concealed in completed construction; provide anchorage devices as necessary to securely fasten windows to adjacent construction; use security fasteners for exposed anchors.
   1. Provide minimum of two anchors per side of window plus one additional anchor for each 18 inches or fraction thereof more than 36 inches in height or width.

B. Glazing Seals: Factory installed; molded EPDM or neoprene compressible gaskets and compression strips.

C. Bituminous Paint: Cold-applied asbestos-free asphalt mastic, complying with SSPC-Paint 33; 30 mils, 0.030 inch minimum thickness per coat.

2.05 FINISHES

END OF SECTION 08 56 53

SECTION 08 58 00
INTERIOR SLIDING PASS WINDOW ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum, medium-duty interior sliding pass window assemblies.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 08 80 00 - Glazing

C. Section 09 21 16 - Gypsum Board Assemblies

1.03 SUBMITTALS

A. Product Data: Submit manufacturer's product data for specified products indicating materials, operation, glazing, finishes, and installation instructions.

B. Shop Drawings: Indicate configuration, sizes, rough-in, mounting, anchors and fasteners, and installation clearances.

C. Samples for Selection of Finishes:
   1. Color Anodized Finishes: Frame member sections showing a range of colors to be expected in finished work.

D. Manufacturer Qualification Statement.

E. Installer Qualification Statement.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least ten years documented experience, and with ability to provide test reports showing that their standard manufactured products meet the specified requirements.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver units in manufacturer's original packaging and unopened containers with identification labels intact.

1.06 WARRANTY

A. Manufacturer Warranty: The manufacturer shall warrant the product/s to be free of defects in material and workmanship for (1) year from the Date of Substantial Completion.

B. Installation Warranty: The installing subcontractor shall warrant the installation to be free of defects in material and workmanship for (1) year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Owner Standard: The products specified in this Section are restricted to those of C.R. Laurence.
   1. Product substitutions: Not permitted.

2.02 INTERIOR SLIDING PASS WINDOW ASSEMBLIES

A. Basis of design: Design is based on aluminum, interior sliding pass window assembly manufactured by C.R. Laurence Co., Inc. (CRL).

B. Pass Window Assembly CRL; Model No. D2301A, consisting of the following components:
   1. Upper Channel: CRL; Model D603, one required
   2. Lower Channel: CRL; Model D603, one required
   3. Rail Inserts: CRL; Model D601, two required

4. Nylon Wheels: CRL; Model D650, set of twelve
5. Top Guides: CRL; Model D652, set of twelve
6. Shoe Extrusion: CRL; Model D610, one required

C. Materials:
1. Frames: Aluminum frame modules shall be constructed of 6063-T5 extruded aluminum. Assemblies roll on base shoes with rollers engaged in lower track.
2. Finish: All aluminum to be clear anodized.
3. Glazing: 1/4 inch (6 mm) tempered safety glass. Glass not included, to be supplied by others.

D. Accessories:
1. Keyed Lock: Model EH102 Chrome Square Plunger Lock with Strike
2. Finger Pulls: Model FP46 Silver Raised Lip Finger Pull
3. End Caps: Model D332, for shoe extrusion, satin anodized.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify the rough openings are ready for installation of the transaction window/s.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions and recommendations.

B. Install units in correct orientation (inside/outside or secure/non-secure).

3.03 CLEANING

A. Remove protective material from factory-finished surfaces, if any.

B. Clean exposed surfaces promptly after installation without damaging finishes.

3.04 PROTECTION

A. Provide temporary protection to ensure that the transaction window/s is/are without damage until Substantial Completion.

END OF SECTION 08 58 00

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. "Hollow Metal Doors and Frames"
   b. FEMA Metal Storm Doors and Frames
   c. Metal Frames for Wood Doors
   d. "Flush Wood Doors"
   e. FEMA Tornado Protection Overhead Rolling Doors
   f. Coiling Counter Doors
   g. Overhead Coiling Doors
   h. Sectional Overhead Doors
   i. "Aluminum-Framed Entrances and Storefronts"
   j. "Security Windows"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

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

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
    a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
    b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
    c. Indicate complete designations of each item required for each opening, include:
        1) Door Index: door number, heading number, and Architect's hardware set number.
        2) Quantity, type, style, function, size, and finish of each hardware item.
        3) Name and manufacturer of each item.
        4) Fastenings and other pertinent information.
        5) Location of each hardware set cross-referenced to indications on Drawings.
        6) Explanation of all abbreviations, symbols, and codes contained in schedule.
        7) Mounting locations for hardware.
        8) Door and frame sizes and materials.
        9) Degree of door swing and handing.
        10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
    a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
    b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
    c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
    d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
    e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
    f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
    a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
    b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
    a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
    b. Catalog pages for each product.
    c. Final approved hardware schedule edited to reflect conditions as installed.
    d. Final keying schedule

e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105

b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    a. Mechanical Warranty
        1) Locks
            a) Schlage ND Series: 10 years
            b) Falcon: 10 years
        2) Exit Devices
            a) Falcon: 10 years
        3) Closers
            a) Falcon SC Series: 10 years
    b. Electrical Warranty
        1) Exit Devices
            a) Von Duprin: 3 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."

   1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

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

2.02 MATERIALS

A. Fabrication

   1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer’s recognized installation standards for application intended.
   2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
   3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with “Metal Doors and Frames”, “Flush Wood Doors”, “Stile and Rail Wood Doors” to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

   1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

   1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
   2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
   3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. McKinney TB series
   b. Best FBB series

B. Requirements:

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

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. 2 inches or thicker doors:
   a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
   b. Interior: Heavy weight, steel, 5 inches (127 mm) high

6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Exterior Doors: Non-removable pins
   d. Out-Swinging Interior Lockable Doors: Non-removable pins
   e. Interior Non-lockable Doors: Non-rising pins

9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Select
   b. Roton

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.
6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Security Door Controls PTM
   b. Precision EPT-12C

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 PIVOT SETS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Rixson
   b. ABH

B. Requirements:

1. Provide pivot sets complete with oil-impregnated top pivot, unless indicated otherwise.
2. Where offset pivots are specified, Provide one intermediate pivot for doors less than 91 inches (2311 mm) high and one additional intermediate pivot per leaf for each additional 30 inches (762 mm) in height or fraction thereof. Intermediate pivots spaced equally not less than 25 inches (635 mm) or not more than 35 inches (889 mm) on center, for doors over 121 inches (3073 mm) high.

3. Provide appropriate model where pivot sets are scheduled at fire rated openings.
4. Provide pivots with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electrified pivot nearest to electrified locking component. If manufacturer of electrified locking component requires another device for power transfer, then provide recommended power transfer device and appropriate quantity of pivots.
5. Provide mortar guard for each electric pivot specified, unless specified in hollow metal frame specification.

2.07 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage ND series

2. Acceptable Manufacturers and Products:
   a. Sargent 11-Line
   b. Corbin-Russwin CL3100 series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
   a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
   b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
   c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
   d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
   e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
   a. Lever Design: Rhodes

2.08 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Falcon TM series

2. Acceptable Manufacturers and Products:
    a. Dormakaba CL800 series
    b. Best 9K series

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
    a. Lever Design: <INSERT LEVER DESIGN>.

2.09 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
    a. Von Duprin 98/35A series

2. Acceptable Manufacturers and Products:
    a. Detex Advantex series
    b. Falcon 24/25 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide smooth touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices at pool gates with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Provide exit devices with manufacturers’ approved strikes.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.

13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
    a. CX
        1) Provide delayed egress devices, where scheduled, that are UL 294 listed, meet National Fire Protection Association (NFPA) and International Building Code (IBC) governing delayed egress, and/or other local and national fire codes acceptable to authority having jurisdiction as required.
            a) Provide non-handed and field sizable device with 3/4 (19mm) throw deadlocking latch bolt. Device incorporates an internal RX switch that detects attempt to exit from applying less than 15lbs to the push pad, which causes this switch to start an irreversible alarm cycle. Key switch in device is capable of arming, disarming, or resetting the device; and indicator lamp determines status of the device.
            b) Provide devices capable of standard 15 second release delay and indefinite release delay as required by code, when tied into fire alarm system will release immediately when an alarm condition exists.
            c) Provide devices with all control inputs – door position input, external inhibit input, fire alarm input; auxiliary locking; nuisance alarm and internal horn; and, remote signaling output self-contained in the device assembly.

2.10 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
    a. Falcon 24/25 series

2. Acceptable Manufacturers and Products:
    a. Precision Apex series
    b. Von Duprin 78/75 series

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer's approved strikes.
8. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.

11. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.11 ELECTRIC STRIKES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Von Duprin 6000 Series

2. Acceptable Manufacturers and Products:
   a. Folger Adam 300 Series
   b. HES 1006 Series

B. Requirements:

1. Provide electric strikes designed for use with type of locks shown at each opening.
2. Provide electric strikes UL Listed as burglary resistant that are tested to a minimum endurance test of 1,000,000 cycles.
3. Where required, provide electric strikes UL Listed for fire doors and frames.
4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.12 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage/Von Duprin PS900 Series

2. Acceptable Manufacturers and Products:
   a. Dynalock 5000 series
   b. Securitron BPS series

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
   a. 12/24 VDC Output, field selectable.
   b. Class 2 Rated power limited output.
   c. Universal 120-240 VAC input.
   d. Low voltage DC, regulated and filtered.

e. Polarized connector for distribution boards.
f. Fused primary input.
g. AC input and DC output monitoring circuit w/LED indicators.
h. Cover mounted AC Input indication.
i. Tested and certified to meet UL294.
j. NEMA 1 enclosure.
k. Hinged cover w/lock down screws.
l. High voltage protective cover.

2.13 KEYING

A. Scheduled System:

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

B. Requirements:

1. Construction Keying:
   a. Temporary Construction Cylinder Keying.
      1) Provide construction cores that permit voiding construction keys without cylinder removal, furnished in accordance with the following requirements.
         a) Split Key or Lost Ball Construction Keying System.
         b) 3 construction control keys, and extractor tools or keys as required to void construction keying.
         c) 12 construction change (day) keys.
      2) Owner or Owner’s Representative will void operation of temporary construction keys.
   b. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner’s Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
      3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
      2) Identification stamping provisions must be approved by the Architect and Owner.

3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.

e. Quantity: Furnish in the following quantities.
1) Permanent Control Keys: 3.
2) Master Keys: 6.
3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
4) Key Blanks: Quantity as determined in the keying meeting.

2.14 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Telkee

2. Acceptable Manufacturers:
   a. HPC
   b. Lund

B. Requirements:

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

2.15 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4040XP series

2. Acceptable Manufacturers and Products:
   a. Corbin-Russwin DC8000 series
   b. Sargent 281 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.

3. Cylinder Body: 1-1/2-inch (38 mm) diameter piston with 5/8-inch (16 mm) diameter double heat-treated pinion journal. QR code with a direct link to maintenance instructions.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards. Provide snap-on cover clip, with plastic covers, that secures cover to spring tube.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck. Provide graphically labelled instructions on the closer body adjacent to each adjustment valve. Provide positive stop on reg valve that prevents reg screw from being backed out.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.
11. Closers shall be capable of being upgraded by adding modular mechanical or electronic components in the field.

2.16 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Falcon SC70A series

2. Acceptable Manufacturers and Products:
   a. LCN 4050 series
   b. Norton 7500 series

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 5/8-inch (16 mm) diameter heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.18 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.19 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson
   b. ABH

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.20 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Trimco
   b. Rockwood

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.21 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Scheduled Manufacturer:

1. Zero International

B. Acceptable Manufacturers:

1. Pemko
2. Legacy

C. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.

1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
   a. Provide non-corrosive fasteners for all exterior applications.
   b. Provide security fasteners where indicated.

2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

D. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 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.

E. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.

1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

F. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

G. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

H. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.

1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

I. Automatic Door Bottoms:

1. Provide closed cell sponge, bulb neoprene. or EPDM type of seal as specified in hardware sets.
2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

J. Rain Drips:

1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
2. Door sweeps or shoes with integral rain drip must meet ADA requirements

K. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.

1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

2.22 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

2. Acceptable Manufacturers:
   a. GE-Interlogix
   b. Sargent

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.23 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

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

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds:

1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing:

1. Apply to head and jamb, forming seal between door and frame.
2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
2. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to 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.

C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.

D. Hardware Sets:

Hardware Group No. 01

For use on Door #(s):
125.2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW NRP		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC		VON
1	EA	LOCK GUARD	LG14		IVE
1	EA	SURFACE CLOSER	SC71A SS		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	SET	GASKETING	429AA-S		ZER
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER
1	EA	CARD READER	BY ACCESS CONTROL PROVIDER		SCE
1	EA	DOOR CONTACT	679-05		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

Hardware Group No. 02

For use on Door #(s):
129

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
3	EA	HINGE	5BB1HW HT SEC	IVE
1	EA	CLASSROOM LOCK	TM561P6 DAN	FAL
1	EA	OH STOP	100S	GLY
1	EA	ARMOR PLATE	8400 34" X 2" LDW B-CS TKTX	IVE
3	EA	SILENCER	SR64	IVE
1	EA	VIEWER	698/U698 AS REQ'D	IVE

NOTE: VIEWER MOUNTED TO SEE INTO HOLDING AREA

Hardware Group No. 03

For use on Door #(s):

101 102.2 109 125.1 126.2 130.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC		VON
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
1	EA	GASKETING	188FSBK PSA		ZER
1	EA	CARD READER	BY ACCESS CONTROL PROVIDER		SCE
1	EA	DOOR CONTACT	679-05		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

NOTE: USE FLOOR STOP FS439 IN LIEU OF WALL STOP AT OPENING 101

Hardware Group No. 04

For use on Door #(s):

108

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC		VON
1	EA	OH STOP	90S		GLY
1	EA	SURFACE CLOSER	SC71A RW/PA (MOUNTED PULL SIDE)		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
1	EA	GASKETING	188FSBK PSA		ZER
1	EA	CARD READER	BY ACCESS CONTROL PROVIDER		SCE
1	EA	DOOR CONTACT	679-05		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

Hardware Group No. 05

For use on Door #(s):
103.3 128

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	INSTITUTION LOCK	ND82P6D RHO		SCH
1	EA	ELECTRIC STRIKE	6211 FSE 12/16/24/28 VAC/VDC		VON
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
1	EA	GASKETING	188FSBK PSA		ZER
2	EA	CARD READER	BY ACCESS CONTROL PROVIDER		SCE
1	EA	DOOR CONTACT	679-05		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

Hardware Group No. 06

For use on Door #(s):
169.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY		IVE
1	EA	DUMMY PUSH BAR	250DT		FAL
1	EA	90 DEG OFFSET PULL	8190EZHD 10" (MTG TYPE AS REQ'D)		IVE
1	EA	SURF. AUTO OPERATOR	4642 120 VAC		LCN
1	EA	ACTUATOR, TOUCH	8310-852T/8310-818T AS REQ'D		LCN
1	EA	FLOOR STOP	FS439		IVE

Hardware Group No. 07

For use on Door #(s):
161.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY		IVE
1	EA	DUMMY PUSH BAR	250DT		FAL
1	EA	90 DEG OFFSET PULL	8190EZHD 10" (MTG TYPE AS REQ'D)		IVE
1	EA	SURF. AUTO OPERATOR	4642 120 VAC		LCN
1	EA	ACTUATOR, TOUCH	8310-852T/8310-818T AS REQ'D		LCN
1	EA	GASKETING	188FSBK PSA		ZER

Hardware Group No. 08

For use on Door #(s):
169.2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY EPT		IVE
1	EA	POWER TRANSFER	EPT10		VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-35A-NL-OP-388 24 VDC		VON
1	EA	CYLINDER	AS REQ'D		FAL
1	EA	DELAYED EGRESS MAG	M490DEP 12/24 VDC		SCE
1	EA	90 DEG OFFSET PULL	8190EZHD 10" (MTG TYPE AS REQ'D)		IVE
1	EA	SURF. AUTO OPERATOR	4642 120 VAC		LCN
1	EA	ACTUATOR, TOUCH	8310-852T/8310-818T AS REQ'D		LCN
1	EA	DUAL VESTIBULE ACTUATOR	8310-855 (MOUNTED IN VESTIBULE TO CONTROL BOTH DOORS)		LCN
1	EA	RAIN DRIP	142AA		ZER
1	EA	WEATHERSTRIPPING	BY DOOR AND FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER
2	EA	CARD READER	BY ACCESS CONTROL PROVIDER		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY PRESENTATION OF VALID CREDENTIAL. EGRESS BY PRESENTATION OF VALID CREDENTIAL. PRESENTATION OF VALID CREDENTIAL ON EITHER SIDE ALLOWS LATCHBOLT TO RETRACT, MAGNETIC LOCK TO RELEASE, AND ACTUATOR TO BECOME ACTIVE AND CAPABLE OF CYCLING THE DOOR AFTER PRESSING. WITHOUT VALID CREDENTIAL. PRESSING ON THE DOOR/PUSHPAD TRIGGERS A LOCAL ALARM AND AN IRREVOCABLE 15 SECOND COUNTDOWN (UP TO 30 SECONDS WITH THE APPROVAL OF AHJ) AT THE END OF 15 SECONDS THE MAG LOCK WILL RELEASE AND EXIT DEVICE WILL PROVIDE FREE EGRESS UNTIL DELAYED EGRESS DEVICE IS RESET.

Hardware Group No. 09

For use on Door #(s):
161.2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY EPT		IVE
1	EA	POWER TRANSFER	EPT10		VON
1	EA	ELEC PANIC HARDWARE	LX-RX-QEL-35A-NL-OP-388 24 VDC		VON
1	EA	CYLINDER	AS REQ'D		FAL
1	EA	DELAYED EGRESS MAG	M490DEP 12/24 VDC		SCE
1	EA	90 DEG OFFSET PULL	8190EZHD 10" (MTG TYPE AS REQ'D)		IVE
1	EA	SURF. AUTO OPERATOR	4642 120 VAC		LCN
1	EA	ACTUATOR, TOUCH	8310-852T/8310-818T AS REQ'D		LCN
1	EA	DUAL VESTIBULE ACTUATOR	8310-855 (MOUNTED IN VESTIBULE TO CONTROL BOTH DOORS)		LCN
1	EA	RAIN DRIP	142AA		ZER
1	SET	GASKETING	429AA-S		ZER
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER
2	EA	CARD READER	BY ACCESS CONTROL PROVIDER		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

DOOR NORMALLY CLOSED AND LOCKED. ENTRY BY PRESENTATION OF VALID CREDENTIAL. EGRESS BY PRESENTATION OF VALID CREDENTIAL. PRESENTATION OF VALID CREDENTIAL ON EITHER SIDE ALLOWS LATCHBOLT TO RETRACT, MAGNETIC LOCK TO RELEASE, AND ACTUATOR TO BECOME ACTIVE AND CAPABLE OF CYCLING THE DOOR AFTER PRESSING. WITHOUT VALID CREDENTIAL. PRESSING ON THE DOOR/PUSHPAD TRIGGERS A LOCAL ALARM AND AN IRREVOCABLE 15 SECOND COUNTDOWN (UP TO 30 SECONDS WITH THE APPROVAL OF AHJ) AT THE END OF 15 SECONDS THE MAG LOCK WILL RELEASE AND EXIT DEVICE WILL PROVIDE FREE EGRESS UNTIL DELAYED EGRESS DEVICE IS RESET.

Hardware Group No. 10

For use on Door #(s):
124.2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY		IVE
1	EA	PANIC HARDWARE	35A-EO		VON
1	EA	SURFACE CLOSER	SC71A SS		FAL
1	EA	MOUNTING PLATE	SC70A-18		FAL
1	EA	CUSH SHOE SUPPORT	SC70A-30		FAL
1	EA	BLADE STOP SPACER	SC70-61		FAL
1	EA	RAIN DRIP	142AA		ZER
1	EA	WEATHERSTRIPPING	BY DOOR AND FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER
1	EA	DOOR CONTACT	7764		SCE

Hardware Group No. 11

For use on Door #(s):
103.2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY		IVE
1	EA	CLASSROOM LOCK	TM561P6 DAN		FAL
1	EA	ELECTRIC STRIKE	6211AL FSE 12/16/24/28 VAC/VDC		VON
1	EA	LOCK GUARD	LG11		IVE
1	EA	SURF. AUTO OPERATOR	4642 120 VAC		LCN
2	EA	ACTUATOR, TOUCH	8310-852T/8310-818T AS REQ'D		LCN
1	EA	RAIN DRIP	142AA		ZER
1	EA	WEATHERSTRIPPING	BY DOOR AND FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER
1	EA	KEYPAD READER	BY ACCESS CONTROL PROVIDER		
1	EA	DOOR CONTACT	7764		SCE
1	EA	POWER SUPPLY	BY ACCESS CONTROL PROVIDER		SCE

Hardware Group No. 12

For use on Door #(s):
100

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY		IVE
1	EA	DEADBOLT	MS1850S X 4089		ADA
1	EA	CYLINDER	AS REQ'D		FAL
1	EA	PUSH/PULL BAR	9190EZHD-12" (MTG TYPE AS REQ'D)		IVE
1	EA	SURF. AUTO OPERATOR	4642 120 VAC		LCN
2	EA	ACTUATOR, TOUCH	8310-852T/8310-818T AS REQ'D		LCN
1	EA	RAIN DRIP	142AA		ZER
1	EA	WEATHERSTRIPPING	BY DOOR AND FRAME MANUFACTURER		
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER

Hardware Group No. 14

For use on Door #(s):

140	141	142	143	146	147
148	150	151	152	153	154
155	156	157	162	163	164
165	166				

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	PASSAGE LATCH	TM101 DAN		FAL
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	MAGNET	SEM7000 SERIES AS REQ'D		LCN
1	EA	GASKETING	188FSBK PSA		ZER

Hardware Group No. 15

For use on Door #(s):
104 106 107 119 127

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	CORRIDOR LOCK	TM571P6 DAN		FAL
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
3	EA	SILENCER	SR64		IVE

LATCH BOLT OPERATED BY LEVERS/KNOBS EXCEPT
WHEN LOCKED BY PUSH BUTTON FROM INSIDE.
KEY IN OUTSIDE LEVER/KNOB LOCKS OR UNLOCKS
LEVER/KNOB AND RELEASES BUTTON.
CLOSING DOOR RELEASES PUSH BUTTON.
INSIDE ALWAYS FREE FOR IMMEDIATE EGRESS.

Hardware Group No. 16

For use on Door #(s):
149

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	CORRIDOR LOCK	TM571P6 DAN		FAL
1	EA	SURFACE CLOSER	SC71A SS		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
3	EA	SILENCER	SR64		IVE

LATCH BOLT OPERATED BY LEVERS/KNOBS EXCEPT
WHEN LOCKED BY PUSH BUTTON FROM INSIDE.
KEY IN OUTSIDE LEVER/KNOB LOCKS OR UNLOCKS
LEVER/KNOB AND RELEASES BUTTON.
CLOSING DOOR RELEASES PUSH BUTTON.
INSIDE ALWAYS FREE FOR IMMEDIATE EGRESS.

Hardware Group No. 17

For use on Door #(s):
102.1 110 111 112 113 114
115 117

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	ENTRANCE LOCK	TM511P6 DAN		FAL
1	EA	WALL STOP	WS404		IVE
3	EA	SILENCER	SR64		IVE

Hardware Group No. 18

For use on Door #(s):
136

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	PASSAGE LATCH	TM101 DAN		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP/HOLDER	FS495		IVE
3	EA	SILENCER	SR64		IVE

Hardware Group No. 19

For use on Door #(s):
103.1 134

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	CLASSROOM LOCK	TM561P6 DAN		FAL
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
3	EA	SILENCER	SR64		IVE

Hardware Group No. 20

For use on Door #(s):
120 121 122 124.1

Provide each DA door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	PIVOT SET	7253 SET		IVE
1	EA	CLASSROOM LOCK	TM561P6 DAN		FAL
1	EA	RESCUE STRIKE	455 5-3/4		HAG
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
1	EA	MEETING STILE	8136 6" (152MM) PSA		ZER
1	EA	ASTRAGAL	398V		ZER
3	EA	SILENCER	SR64		IVE

Hardware Group No. 21

For use on Door #(s):
130.2

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	CLASSROOM LOCK	TM561P6 DAN		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
3	EA	SILENCER	SR64		IVE

Hardware Group No. 22

For use on Door #(s):
132

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
3	EA	SILENCER	SR64		IVE

Hardware Group No. 23

For use on Door #(s):
105 116

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
3	EA	SILENCER	SR64		IVE

Hardware Group No. 24

For use on Door #(s):
139.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	SURFACE CLOSER	SC71A RW/PA		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	WALL STOP	WS404		IVE
1	EA	GASKETING	188FSBK PSA		ZER

Hardware Group No. 24A

For use on Door #(s):
173.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
3	EA	HINGE	5BB1HW NRP		IVE
1	EA	STOREROOM LOCK	TM581P6 DAN		FAL
1	EA	LOCK GUARD	LG10		IVE
1	EA	SURFACE CLOSER	SC71A SS		FAL
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		IVE
1	EA	RAIN DRIP	142AA		ZER
1	SET	GASKETING	429AA-S		ZER
1	EA	DOOR SWEEP	39A		ZER
1	EA	THRESHOLD	65A-223		ZER

Hardware Group No. 25

For use on Door #(s):
133 144 158

Provide each CO door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
1	EA	NOTE	NO HARDWARE REQUIRED	

Hardware Group No. 26

For use on Door #(s):
125.3 131 139.2 173.2 173.3

Provide each RU door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
	EA	NOTE	ALL HARDWARE BY OVERHEAD DOOR MANUFACTURER	BYO

Hardware Group No. 27

For use on Door #(s):
123.1 123.2

Provide each FLD door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	MFR
1	EA	CYLINDER	AS REQ'D	FAL
	EA	NOTE	REMAINDER OF HARDWARE BY DOOR SUPPLIER	

Hardware Group No. 28

For use on Door #(s):
126.1

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER		MFR
1	EA	CONT. HINGE	112XY EPT		IVE
1	EA	POWER TRANSFER	EPT10		VON
1	EA	ELEC PANIC HARDWARE	RX-QEL-ESL-WS-T-9957-L-KC-17-SNB LENGTH & HEIGHT AS REQ		VON
1	EA	LATCH GUARD	WS-LGO LENGTH AS REQ		VON
1	EA	RIM CYLINDER	20-057 ICX W/KEYED CONST. CORE (FOR L-KC)		SCH
1	EA	MORTISE CYLINDER	20-061 ICX W/KEYED CONST. CORE (FOR ESL)		SCH
2	EA	FSIC PERMANENT CORE	23-030		SCH
1	EA	SURFACE CLOSER	4040XP SCUSH MC TBWMS X MTG BRKT, SPCR & PLATE AS REQ		LCN
1	EA	RAIN DRIP	142AA DW + 4" (OMIT @ COVERED OPENINGS)		ZER
1	SET	GASKETING	328AA H & J		ZER
1	EA	DOOR SWEEP	8198AA		ZER
1	EA	THRESHOLD	656A (COORDINATE WITH SILL DETAIL)		ZER
1	EA	CREDENTIAL READER	AS SPECIFIED IN DIVISION 28		UNK
1	EA	DOOR CONTACT	679-05		SCE
1	EA	POWER SUPPLY	PS902 900-4R 120/240 VAC		VON

-FOR USE WITH STEELCRAFT PALADIN DOOR ASSEMBLY.
-MEETS ICC 500-2020 AND FEMA 320/361.
-MAXIMUM DOOR SIZE 4'0 X 8'0 (SINGLE) AND 8'0 X 8'0 (PAIR).
-IF ANOTHER DOOR MFR. IS USED CONSULT WITH THEM FOR APPROVED HARDWARE, DOORS AND HARDWARE ARE SOLD AS A COMPLETE TESTED ASSEMBLY.
-GC TO PROVIDE SIGNAGE THAT MEETS ICC 500-2020 REQUIREMENTS, AS NEEDED.

-INGRESS BY CREDENTIAL READER OR KEY OVERRIDE.
-CREDENTIAL READER IS DISABLED WHEN ESL IS SET TO "LOCKED" STATE. EMERGENCY KEY OVERRIDE BY L-KC (KEY CAPTURE).
-FREE EGRESS BY THE PUSH PAD.
-COORDINATE POWER SUPPLY WITH SECURITY CONTRACTOR PRIOR TO SUBMITTALS.
-OMIT POWER SUPPLY WHERE PROVIDED BY SECURITY.

END OF SECTION

SECTION 08 80 00
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants

B. Section 08 14 16 - Flush Wood Doors

C. Section 08 43 13 - Aluminum-Framed Storefronts

D. Section 08 44 13 - Glazed Aluminum Curtain Walls

E. Section 08 83 00 - Mirrors.

F. Section 08 87 23 - Safety and Security Films.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2026).

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

F. ASTM C1036 - Standard Specification for Flat Glass; 2021.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2018.

H. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2016.

I. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2021a.

J. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2016.

K. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2019.

L. GANA (GM) - GANA Glazing Manual; 2008.

M. GANA (LGRM) - Laminated Glazing Reference Manual; 2019.

N. GANA (SM) - GANA Sealant Manual; 2008.

O. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).

P. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2020.

Q. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2020.

R. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2023.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by each of the affected installers.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data on Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

D. Manufacturer's qualification statement.

E. Installer's qualification statement.

F. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.07 FIELD CONDITIONS

1.08 WARRANTY

A. See Section 013300 for additional warranty requirements.

B. Insulating Glass Units (when applicable): Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Laminated Glass (when applicable): Provide a five (5) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fabricators: Basis of Design Guardian Glass
   1. GGI - General Glass International: www.generalglass.com/#sle.
   2. Standard Bent Glass Corp: www.standardbent.com/#sle.
   3. Thompson I.G., LLC: www.thompsonig.com/#sle.
   4. Trulite Glass & Aluminum Solutions, LLC: www.trulite.com/#sle.
   5. Viracon, Inc: www.viracon.com/#sle.

B. Float Glass Manufacturers:
   1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
   2. Guardian Glass, LLC: www.guardianglass.com/#sle.
   3. Pilkington North America Inc: www.pilkington.com/na/#sle.
   4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.

2.02 DESIGN & PERFORMANCE REQUIREMENTS

A. Delegated Design: Design glazing systems, including comprehensive engineering analysis by a qualified professional engineer (when applicable), using the design criteria specified below.
   1. General Design Criteria:
      a. Building Code: 2018 IBC.

b. Structural Design Standard: See Structural Drawings
c. Occupancy Risk Category: See Structural Drawings

2. Seismic Design Criteria:
   a. Seismic Design Category: Category B.
   b. Site Class: [Global - Soil Class] - Stiff Soil
   c. Refer to Structural Documents for additional seismic design/ detailing requirements.
3. Wind-Resistance Design Criteria:
   a. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
   b. Ultimate Design Wind Speed, V_{ULT}: See Structural Drawings.
   c. Exposure Category: See Structural Drawings

B. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
2. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7
3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
4. Glass thicknesses listed are minimum.

C. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
1. In conjunction with weather barrier related materials described in other sections, as follows:

D. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
4. Fully Tempered (Safety) Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
5. Impact Resistant Safety Glass (when applicable): Complies with ANSI Z97.1 - Class B, or 16 CFR 1201 - Category I criteria.
6. Tinted Type: ASTM C1036, Class 2 - Tinted, Quality - Q3, with color and performance characteristics as indicated.
7. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
2. Guardian Glass, LLC: www.guardianglass.com/#sle.

3. Pilkington North America Inc; _____: www.pilkington.com/na/#sle.Pilkington North America Inc; _____: www.pilkington.com/na/#sle.
4. Viracon, Apogee Enterprises, Inc: www.viracon.com/#sle.
5. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.

B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.

C. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Aluminum.
5. Edge Seal:
   a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
   b. Color: Black.
6. Purge interpane space with dry air, hermetically sealed.

D. Insulating Glass Unit Types:
1. Type IG-1 - Insulating Glass Units: Vision glass, double glazed.
   a. Applications:
      1) Exterior glazing. Ensure Glass is Tempered where required by code.
   b. Space between lites filled with argon.
   c. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
      1) Manufacturer: Guardian
         (a) Coating: Sunguard SNR35, on #2 surface.
   d. Metal edge spacer.
   e. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
      1) Tint: Clear.
   f. Total Thickness: 1 inch.

2.05 SINGLE (MONOLITHIC) GLAZING

A. Type GL-1 - SAFETY GLAZING (TEMPERED)
1. Applications:
   a. Glazed lites in doors, except fire doors.
   b. Glazed sidelights to doors, except in fire-rated walls and partitions.
   c. Other locations required by applicable federal, state, and local codes and regulations.
2. Glass Type: Fully tempered safety glass.
3. Tint: Clear.
4. Thickness: 1/4 inch, nominal.
5. Glazing Method: Dry glazing method, gasket glazing.

2.06 GLAZING COMPOUNDS

A. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; gray color.

B. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

C. Polysulfide Sealant: Two component; chemical curing, nonsagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

D. Polyurethane Sealant: Single component, chemical curing, nonstaining, nonbleeding; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 20 to 35; _____ color.

E. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; _____ color.

F. Manufacturers:
   1. Dow Corning Corporation: www.dowcorning.com/construction/#sle.
   2. Master Builders Solutions: www.master-builders-solutions.com/en-us/#sle.
   3. Pecora Corporation: www.pecora.com/#sle.
   4. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

2.07 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
   1. Width: As required for application.
   2. Thickness: As required for application.
   3. Spacer Rod Diameter: As required for application.
   4. Manufacturers:
      a. Tremco Global Sealants: www.tremcosealants.com/#sle.
      b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

C. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

3.04 INSTALLATION - BUTT JOINT GLAZING METHOD (SEALANT ONLY)

A. Temporarily brace glass in position for duration of glazing process; mask edges of glass at adjoining glass edges and between glass edges and framing members.

B. Temporarily secure a small diameter nonadhering foamed rod on back side of joint.

C. Apply sealant to open side of joint in continuous operation; thoroughly fill joint without displacing foam rod, and then tool sealant surface smooth to concave profile.

D. Permit sealant to cure then remove foam backer rod, and then apply sealant to opposite side, tool smooth to concave profile.

E. Remove masking tape.

3.05 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.06 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 80 00

SECTION 08 83 00
MIRRORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall-mounted, unframed, glass mirrors.
   1. Annealed float glass.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

C. ASTM C1036 - Standard Specification for Flat Glass; 2021.

D. GANA (GM) - GANA Glazing Manual; 2008.

E. GANA (SM) - GANA Sealant Manual; 2008.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

C. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.

D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name, and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM) and GANA (SM) for glazing installation methods.

B. Fabricate, store, transport, receive, install, and clean mirrors in accordance with manufacturer's recommendations.

1.06 FIELD CONDITIONS

A. Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.07 WARRANTY

A. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same, beginning at the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Guardian Industries Corp.
   1. Other acceptable Manufacturers:
      a. Binswanger Mirror/ACI Distribution: www.binswangerglass.com/#sle.
      b. Lenoir Mirror Co: www.lenoirmirror.com/#sle.
      c. Trulite Glass and Aluminum Solutions LLC: www.trulite.com/#sle.
      d. Walker Glass Company Ltd: www.walkerglass.com/#sle.

2.02 MATERIALS

A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.

B. Mirror Glass: Clear, annealed float glass; ASTM C1036, with copper and silver coatings, and protective overcoating.

C. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

2.03 FRAMELESS MIRRORS

A. Frameless Mirrors, designated in the "FFE Schedule" on the Drawings as Accessory Type 1066, with sub number corresponding to the size of the mirror if multiple sizes used:

B. Basis of Design Product: Guardian; Ultra Mirrors.
   1. Thickness: 1/4 inch.
   2. Edges: Seamed (Where edges are not visible); Flat polished edges where visible.
   3. Sizes: As indicated on drawings.
   4. Safety Backing Film: Provide an applied Category II Safety Film across the entire back of the mirror. Safety tape is not acceptable.
      a. Product: C.R. Laurence; #2MT48 Shatterproof Safety Film for Mirrors, or equivalent.
   5. Mounting Height:
      a. Lavatory Mirrors: 40-inches (maximum) above finished floor to bottom of reflecting surface.
      b. Large Format Mirrors: As indicated on Drawings

2.04 ACCESSORIES

A. Mirror Adhesive: Silicone pre-polymer based, chemically compatible with mirror coating and wall substrate.

B. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
   1. J-Channels formed with an indented back to hold the mirror away from the wall which allows air to circulate behind mirror.
   2. Products:
      a. Bottom Trim: C.R. Laurence; Model No. D657A "Heavy Indented Back Aluminum 1/4-inch J-Channel".
      b. Top Trim: C.R. Laurence; Model No. D651A "Deep Nose Heavy Indented Back Aluminum 1/4-inch J-Channel".
   3. Material: Comply with ASTM B221 (ASTM B221M), 6005-T6 alloy and temper.
   4. Finish: Anodized, clear.

2.05 FABRICATION

A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.

B. Cutouts (if applicable): Fabricate cutouts before tempering for notches and holes in minors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

C. Mirror Edge Treatment: Flat polished.
   1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.

D. Safety Backing: Factory apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examines substrates over which mirrors are to mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance.

3.02 INSTALLATION

A. Install mirrors in accordance with manufacturer's recommendations.

B. Set mirrors plumb and level, and free of optical distortion.

C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.

D. Frameless Mirrors: Set mirrors in proper place with adhesive and attachment hardware, applied in accordance with adhesive manufacturer's instructions.

3.03 CLEANING

A. Clean mirrors and adjacent surfaces.

END OF SECTION 08 83 00

SECTION 08 87 23
SAFETY AND SECURITY WINDOW FILMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Security laminates applied to glazing assemblies

1.02 RELATED REQUIREMENTS

A. Section 081113 - Hollow Metal Doors and Frames

B. Section 08 43 13 - Aluminum-Framed Entrances and Storefronts

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test; 2015 (Reaffirmed 2020).

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

D. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting; 2021.

E. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion by the Taber Abraser; 2019.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

G. ASTM E308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2022.

H. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres; 2020.

I. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes; 2026.

1.04 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Record of product certification for safety requirements.
   2. Preparation instructions and recommendations.
   3. Storage and handling requirements and recommendations.
   4. Installation methods.

B. Shop Drawings: Detailing installation of the security laminate, anchoring accessories, and sealant.

C. Samples: For each product to be used, minimum size 4 inches by 6 inches, representing actual product, and color.

D. Test Reports: Detailed reports of full-scale chamber tests to specified criteria, using assemblies identical to those required for this project.

E. 3rd Party Test Reports: Submit the following 3rd Party test reports indicating compliance with the test values listed in this Section.
   1. Flammability Testing, ASTM E84
   2. Film Properties Testing, ASTM D882
   3. Abrasion Resistance Testing, ASTM D1044
   4. Peel Strength Testing, ASTM D3330
   5. Tear Resistance Testing
   6. Puncture Strength Testing, ASTM D4830.
   7. Safety Glazing Impact Testing, ANSI Z97.1 and/or 16 CFR 1201.

8. Impact Resistance and Pressure Cycling, ASTM E1886 and ASTM E1996.

F. Warranty: Provide a copy of the manufacturer’s standard warranty.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer specializing in the manufacture of security laminates, with minimum 10-years of experience.

B. Installer Qualifications: Certified by the security laminate manufacturer

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within the limits recommended by the manufacturer for optimum results.

1.08 WARRANTY

A. Manufacturers Warranty: Provide manufacturer's replacement warranty to cover security laminate against peeling, cracking, discoloration, and deterioration for a period of 10-years from the Date of Substantial Completion.

B. Installation Warranty: The installing subcontractor shall warrant the installation to be free of defects in material and workmanship for one (1) year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Advanced Coatings Enterprises LLC (ACE)
   1. Products of other manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
      a. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”

2.02 SECURITY LAMINATE

A. Basis of Design Product: ACE; 200 Series SL-9 Security Laminate
   1. Threat Protection: Aggressive forced entry
   2. Design and Performance Requirements:
      a. Laminate Color: Transparent
      b. Number of Laminate Layers: 2
      c. Laminate Thickness with Adhesive: 0.009-inches (229-microns)
      d. Break Strength: 221 psi per ASTM D882
      e. Tensile Strength: 28,500 psi per ASTM D882
      f. UV Radiation Rejection: 99%
      g. Uniformity: No noticeable pin holes, streaks, thin spots, scratches, banding, or other optical defects
   3. Applications:
      a. Glazing in interior borrowed lite frames
      b. Glazing in interior door vision lites

2.03 MATERIALS

A. Accessory Materials: As recommended or required by the manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing conditions are adequate for the proper application and performance of the security laminate.

3.02 PREPARATION

A. Clean glass of dust, dirt, paint, oil, grease, mildew, mold, and other contaminants that would inhibit adhesion.

B. Immediately before applying the security laminate, thoroughly wash the glass with a neutral cleaning solution.

C. Protect adjacent surfaces.

D. Do not begin installation until substrates have been properly prepared.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions, without air bubbles, wrinkles, streaks, bands, thin spots, pinholes, or gaps, as required to achieve specified performance.

B. Accurately cut security laminate with straight edges to required sizes allowing 1/16 inch to 1/8 inch gap at perimeter of the glazed panel unless otherwise required by anchorage method.

C. Seams: Seam security laminate only as required to accommodate material sizes; form seams vertically without overlaps and gaps; do not install with horizontal seams.

D. Supplemental Anchors: Install in accordance with manufacturer's instructions and shop drawings.

3.04 CLEANING

A. Clean glass and anchoring accessories following installation. Remove excess sealants and other glazing materials from adjacent finished surfaces.

B. Remove labels and protective covers.

3.05 PROTECTION

A. Protect installed products until completion of the project.

B. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

END OF SECTION 08 87 23

SECTION 09 05 61
COMMON WORK RESULTS FOR FLOORING PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section applies to floors identified in Contract Documents that are receiving the following types of floor coverings:
   1. Resilient tile and sheet.

B. Removal of existing floor coverings.

C. Preparation of new and existing concrete floor slabs for installation of floor coverings.

D. Testing of concrete floor slabs for moisture and alkalinity (pH).

E. Remediation of concrete floor slabs due to unsatisfactory moisture or alkalinity (pH) conditions.
   1. Contractor shall perform all specified remediation of concrete floor slabs. If such remediation is indicated by testing agency's report and is due to a condition not under Contractor's control or could not have been predicted by examination prior to entering into the contract, a contract modification will be issued.

F. Patching compound.

G. Remedial floor treatment.

1.02 RELATED REQUIREMENTS

Section 09 65 00 - Resilient Flooring and Accessories

1.03 REFERENCE STANDARDS

A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens); 2020b.

B. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete; 2020.

C. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2023.

D. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2019a.

E. RFCI (RWP) - Recommended Work Practices for Removal of Resilient Floor Coverings; 2011.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate scheduling of cleaning and testing, so that preliminary cleaning has been completed for at least 24 hours prior to testing.

1.05 SUBMITTALS

A. Visual Observation Report: For existing floor coverings to be removed.

B. Floor Covering and Adhesive Manufacturers' Product Literature: For each specific combination of substrate, floor covering, and adhesive to be used; showing:
   1. Moisture and alkalinity (pH) limits and test methods.
   2. Manufacturer's required bond/compatibility test procedure.

C. Remedial Materials Product Data: Manufacturer's published data on each product to be used for remediation.
   1. Manufacturer's qualification statement.
   2. Certificate: Manufacturer's certification of compatibility with types of flooring applied over remedial product.
   3. Test reports indicating compliance with specified performance requirements, performed by nationally recognized independent testing agency.

4. Specimen Warranty: Copy of warranty to be issued by coating manufacturer and certificate of underwriter's coverage of warranty.

D. Testing Agency's Report:
   1. Description of areas tested; include floor plans and photographs if helpful.
   2. Summary of conditions encountered.
   3. Moisture and alkalinity (pH) test reports.
   4. Copies of specified test methods.
   5. Recommendations for remediation of unsatisfactory surfaces.
   6. Product data for recommended remedial coating.
   7. Certificate: Include certification of accuracy by authorized official of testing agency.
   8. Submit report directly to Owner.
   9. Submit report to Architect.
   10. Submit report not more than two business days after conclusion of testing.

E. Adhesive Bond and Compatibility Test Report.

F. Copy of RFCI (RWP).

1.06 QUALITY ASSURANCE

A. Moisture and alkalinity (pH) testing will be performed by an independent testing agency employed and paid by Owner.

B. Testing Agency Qualifications: Independent testing agency experienced in the types of testing specified.
   1. Submit evidence of experience consisting of at least 3 test reports of the type required, with project Owner's project contact information.

C. Contractor's Responsibility Relating to Independent Agency Testing:
   1. Provide access for and cooperate with testing agency.
   2. Confirm date of start of testing at least 10 days prior to actual start.
   3. Allow at least 4 business days on site for testing agency activities.
   4. Achieve and maintain specified ambient conditions.
   5. Notify Owner when specified ambient conditions have been achieved and when testing will start.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect products in accordance with manufacturer’s instructions and recommendations.

B. Deliver materials in manufacturer’s packaging; include installation instructions.

C. Keep materials from freezing.

1.08 FIELD CONDITIONS

A. Maintain ambient temperature in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 65 degrees F or more than 85 degrees F.

B. Maintain relative humidity in spaces where concrete testing is being performed, and for at least 48 hours prior to testing, at not less than 40 percent and not more than 60 percent.

PART 2 PRODUCTS

2.01 MATERIALS

A. Patching Compound: Floor covering manufacturer's recommended product, suitable for conditions, and compatible with adhesive and floor covering. In the absence of any recommendation from flooring manufacturer, provide a product with the following characteristics:
   1. Cementitious moisture-, mildew-, and alkali-resistant compound, compatible with floor, floor covering, and floor covering adhesive, and capable of being feathered to nothing at edges.

2. Compressive Strength: 3000 psi, minimum, after 28 days, when tested in accordance with ASTM C109/C109M or ASTM C472, whichever is appropriate.
3. Products:
    a. ARDEX Engineered Cements; ARDEX Feather Finish: www.ardexamericas.com/#sle.

B. Remedial Floor Treatment: Penetrating, spray-applied, silicate-based product intended by its manufacturer to resist water vapor transmission to degree sufficient to meet flooring manufacturer's emission limits, resistant to the level of alkalinity (pH) found, and suitable for adhesion of flooring without further treatment.
1. Use product recommended by testing agency.
2. Products:
    a. AVECS, LLC; RE-ACT: www.avecs.build/#sle.
    b. Substitutions: See section 006325.

PART 3 EXECUTION

3.01 CONCRETE SLAB PREPARATION

A. Perform following operations in the order indicated:
1. Existing concrete slabs (on-grade and elevated) with existing floor coverings:
    a. Visual observation of existing floor covering, for adhesion, water damage, alkaline deposits, and other defects.
    b. Removal of existing floor covering.
2. Preliminary cleaning.
3. Moisture vapor emission tests; 3 tests in the first 1000 square feet and one test in each additional 1000 square feet, unless otherwise indicated or required by flooring manufacturer.
4. Internal relative humidity tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
5. Alkalinity (pH) tests; in same locations as moisture vapor emission tests, unless otherwise indicated.
6. Specified remediation, if required.
7. Patching, smoothing, and leveling, as required.
8. Other preparation specified.
9. Adhesive bond and compatibility test.
10. Protection.

3.02 REMOVAL OF EXISTING FLOOR COVERINGS

A. Comply with local, State, and federal regulations and recommendations of RFCI (RWP), as applicable to floor covering being removed.

B. Dispose of removed materials in accordance with local, State, and federal regulations and as specified.

3.03 PRELIMINARY CLEANING

A. Clean floors of dust, solvents, paint, wax, oil, grease, asphalt, residual adhesive, adhesive removers, film-forming curing compounds, sealing compounds, alkaline salts, excessive laitance, mold, mildew, and other materials that might prevent adhesive bond.

B. Do not use solvents or other chemicals for cleaning.

3.04 MOISTURE VAPOR EMISSION TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F1869 and as follows.

D. Plastic sheet test and mat bond test may not be substituted for the specified ASTM test method, as those methods do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if test values exceed 3 pounds per 1000 square feet per 24 hours.

F. Report: Report the information required by the test method.

3.05 INTERNAL RELATIVE HUMIDITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. Where this specification conflicts with the referenced test method, comply with the requirements of this section.

C. Test in accordance with ASTM F2170 Procedure A and as follows.

D. Testing with electrical impedance or resistance apparatus may not be substituted for the specified ASTM test method, as the values determined are not comparable to the ASTM test values and do not quantify the moisture content sufficiently.

E. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if any test value exceeds 75 percent relative humidity.

F. Report: Report the information required by the test method.

3.06 ALKALINITY TESTING

A. Where the floor covering manufacturer's requirements conflict with either the referenced test method or this specification, comply with the manufacturer's requirements.

B. In the event that test values exceed floor covering manufacturer's limits, perform remediation as indicated. In the absence of manufacturer limits, perform remediation if alkalinity (pH) test value is over 10.

3.07 PREPARATION

A. See individual floor covering section(s) for additional requirements.

B. Comply with requirements and recommendations of floor covering manufacturer.

C. Fill and smooth surface cracks, grooves, depressions, control joints and other non-moving joints, and other irregularities with patching compound.

D. Do not fill expansion joints, isolation joints, or other moving joints.

3.08 ADHESIVE BOND AND COMPATIBILITY TESTING

A. Comply with requirements and recommendations of floor covering manufacturer.

3.09 APPLICATION OF REMEDIAL FLOOR COATING

A. Comply with requirements and recommendations of coating manufacturer.

3.10 APPLICATION OF REMEDIAL FLOOR TREATMENT

A. Comply with requirements and recommendations of treatment manufacturer.

3.11 PROTECTION

A. Cover prepared floors with building paper or other durable covering.

END OF SECTION 09 05 61

SECTION 09 21 16
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Gypsum board assemblies including walls, partitions, and soffits

B. Gypsum wallboard.

C. Accessories, trim, and joint finishing.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 21 00 - Thermal Insulation

C. Section 07 84 00 - Firestopping

D. Section 07 92 00 - Joint Sealants

E. Section 09 22 16 - Non-Structural Metal Framing.

F. Section 09 90 00 - Painting and Coatings

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2017 (Reapproved 2022).

C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2018.

D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2020.

E. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2022.

F. ASTM C955 - Standard Specification for Cold-Formed Steel Structural Framing Members; 2018, with Editorial Revision.

G. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2022.

H. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 2019.

I. ASTM C1199 - Standard Test Method for Measuring the Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods; 2022.

J. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2017.

K. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2019.

L. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels; 2019, with Editorial Revision (2020).

M. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2021.

N. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

O. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

P. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 °C; 2022.

Q. ASTM E413 - Classification for Rating Sound Insulation; 2022.

R. GA-214 - Levels of Finish for Gypsum Panel Products; 2021.

S. GA-216 - Application and Finishing of Gypsum Panel Products; 2021.

T. GA-600 - Fire Resistance and Sound Control Design Manual; 2021.

1.04 SUBMITTALS

A. Product Data: Provide data on gypsum board, accessories, and joint finishing system.

B. Samples: Submit two samples of gypsum board finished with a Level 3 and 4 finish application, 24 inches by 24 inches in size, illustrating preparation techniques and application workmanship.

1.05 QUALITY ASSURANCE

A. Gypsum Board System Standards:
   1. Materials: Comply with Gypsum Association GA-201 "Using Gypsum Board for Walls and Ceilings."
   2. Application and Finishing: Comply with following:
      a. Gypsum Association GA-216 "Recommended Specifications for Application and Finishing of Gypsum Panel Products."
      b. Gypsum Association GA-214 "Levels of Finish for Gypsum Panel Products."

B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

C. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.

D. Fire Resistance Ratings: Where indicated, provide materials and construction which are identical to those of assemblies whose fire resistance rating has been determined per ASTM C1199 by a testing and inspecting organization acceptable to authorities having jurisdiction.
   1. Provide fire-resistance-rated assemblies, identical to those indicated by reference to GA File Numbers inGA-600, Fire Resistance Design Manual, or to design designations in UL, Fire Resistance Directory, or in listing of other testing and agencies acceptable to authorities having jurisdiction.

E. Single Source Responsibility: Obtain gypsum board and joint treatment materials from a single manufacturer.

1.06 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 manufacturer's recommended limits.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840, GA-201, GA-214, and GA-216.
   1. See PART 3 for finishing requirements.

B. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Fire-Resistance-Rated Assemblies (when applicable): Provide completed assemblies complying with applicable code. Provide materials and construction identical to those tested in assembly indicated in accordance with ASTM E119 by an independent testing agency.

2.02 METAL FRAMING MATERIALS

A. Non-structural Steel Framing for Application of Gypsum Board: See Section 09 22 16.

B. Structural Steel Framing for Application of Gypsum Board: See Section 05 40 00.

2.03 MANUFACTURERS

A. Gypsum Board Manufacturers:
   1. CertainTeed Corporation: www.certainteed.com/#sle.
   2. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
   3. National Gypsum Company: www.nationalgypsum.com/#sle.
   4. USG Corporation: www.usg.com/#sle.

2.04 GYPSUM BOARD - GENERAL

A. Gypsum Wallboard - General: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings.
   2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   4. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings and Soffits: 1/2 inch.
      c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.

B. Interior Gypsum Panels are designated in this Section as Panel Type GB- #.

C. Material Standard:
   1. All interior gypsum wallboard shall be moisture-resistant and mold-resistant.
   2. All interior gypsum wallboard on vertical surfaces shall be Type 'X' material. This applies to fire-resistive-rated assemblies and non-fire-rated assemblies.

2.05 GYPSUM BOARD TYPES

A. Type GB-1: GYPSUM PANELS: TYPE X (REGULAR)
   1. Basis of Design:
      a. USG Corporation; USG Sheetrock Brand EcoSmart Panels Firecode X: www.usg.com/#sle.
   2. Physical Properties:
      a. Non-Combustibility (ASTM E136): Meets or exceeds criteria.
      b. Surface-Burning Characteristics (ASTM E84):
         1) Flame Spread: 5.
      c. Smoke Developed: 5.
         1) Class A
      d. Mold Resistance (ASTM D3273): Meets or exceeds criteria
   3. Uses:
      a. Occurs at all walls throughout the project unless otherwise noted
      b. Fire-rated wall construction
      c. Non-fire rated wall construction
      d. Fire-rated ceiling and soffit construction where required

B. Type GB-4: GYPSUM PANELS: TYPE X, HIGH-IMPACT, MOISTURE & MOLD-RESISTANT
   1. Impact-Resistant Wallboard:
      a. Application: High-traffic areas indicated.
      b. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
      c. Indentation: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
      d. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.

e. Hard Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
f. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
g. Paper-Faced Type: Gypsum wallboard, as defined in ASTM C1396/C1396M.
h. Type: Fire-resistance-rated Type X, UL or WH listed.
i. Thickness: 5/8 inch.
j. Edges: Tapered.
k. Paper-Faced Products:
1) American Gypsum Company; M-Bloc IR Type X: www.americangypsum.com/#sle.
2) CertainTeed Corporation; Extreme Impact Resistant Drywall with M2Tech: www.certainteed.com/#sle.
3) Continental Building Products; Protecta HIR 300 Type X with Mold Defense: www.continental-bp.com/#sle.
4) National Gypsum Company; Gold Bond Hi-Impact XP Gypsum Board: www.nationalgypsum.com/#sle.
5) USG Corporation; USG Sheetrock Brand Mold Tough VHI Firecode X Panels: www.usg.com/#sle.

C. Type GB-5: GYPSUM PANELS: TYPE X, MOISTURE-RESISTANT GLASS-MAT BACKER BOARD
1. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.
a. Application: Vertical surfaces behind thinset tile, except in wet areas.
b. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
c. Type: Type X, in locations indicated.
d. Type X Thickness: 5/8 inch.
e. Edges: Tapered.
f. Products:
1) American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
2) USG; Durock™ Brand Glass-Mat Tile Backerboard.
3) Substitutions: See Section 01 60 00 - Product Requirements.

D. Type GB-7: GYPSUM CEILING PANELS, MOISTURE- AND MOLD-RESISTANT
1. Compliance: ASTM C1396/C1396M, for water-resistant gypsum wallboard and exterior gypsum soffit board
a. Application: Ceilings and soffits, unless otherwise indicated.
b. Thickness: 1/2 inch.
c. Edges: Tapered.
d. Product: USG; "Sheetrock® Brand UltraLight Gypsum Panels Mold Tough"

E. Type GB-8: LEAD-BACKED GYPSUM PANELS, TYPE X
1. Refer to Section 13 49 13 for requirements, when applicable

F. Type GB-9: ACOUSTICAL SOUND-DAMPENING GYPSUM PANELS, TYPE X
1. Composition: Two layers of heavy paper-faced, high-density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.
a. Thickness: 5/8 inch, Type X.
b. Long Edges: Tapered.
c. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
d. Products:
1) CertainTeed Corporation; SilentFX Quick Cut Type X Gypsum Board: www.certainteed.com/#sle.

2) National Gypsum Company; Gold Bond SoundBreak XP Type X Gypsum Board: www.nationalgypsum.com/#sle.
3) _____.

2.06 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Insulation: See Section 07 21 00.

B. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
2. Tape Thickness: 1/4 inch.
3. Products:
a. Armacell LLC; ArmaSound MTD: www.armacell.us/#sle.
b. Substitutions: See section 006325.

C. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
1. Products:
a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
b. Liquid Nails, a brand of PPG Architectural Coatings; _____: www.liquidnails.com/#sle.
c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: www.stifirestop.com/#sle.

D. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
1. Corner Beads: Low profile, for 90-degree outside corners.
a. Products:
1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
2) ClarkDietrich; Strait-Flex Big-Stick: www.clarkdietrich.com/#sle.
3) Phillips Manufacturing Co; Everlast Corner Bead: www.phillipsmfg.com/#sle.
4) Trim-Tex, Inc: www.trim-tex.com/#sle.
2. Splayed Corner Beads: Angled corners as required.
3. L-Trim with Tear-Away Strip: Sized to fit 5/8 inch thick gypsum wallboard.
a. Products:
1) Phillips Manufacturing Co; gripSTIK L-Tear: www.phillipsmfg.com/#sle.
4. Control Joints:
a. Type: V-shaped metal with factory-installed protective tape.
b. Products:
1) Phillips Manufacturing Co: www.phillipsmfg.com/#sle.
2) Trim-Tex, Inc: www.trim-tex.com/#sle.

E. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
3. Products:
a. Continental Building Products: www.continental-bp.com/#sle.
4. Joint Compound: Setting type, field-mixed.

F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.02 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.

C. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.03 WALLBOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
   1. Exception: Tapered edges to receive joint treatment at right angles to framing.

C. Double-Layer, Non-rated: Use gypsum board for the first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Place the second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

3.04 CONTROL JOINTS

A. Compliance: ASTM C840 and Gypsum Association GA-234 recommendations.

B. Discontinue gypsum board and use control joint trim at control joints.

C. When not indicated on Drawings, install control joints at spacings and locations where any of the conditions listed below occur:
   1. Partitions (Walls):
      a. Where an interior wall or partition runs in an uninterrupted straight plane exceeding 30 feet (9 m) in length or height.
      b. Partition abuts a structural member (except floors) or dissimilar wall construction (masonry, concrete, etc.).
      c. Partition traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
      d. Control joint is desired or incorporated as a design accent or architectural feature.
   2. Ceilings:
      a. For interior ceilings with perimeter relief (no connection between the wall gypsum panel to the ceiling gypsum panel), install control joints so that linear dimensions between control joints shall not exceed 50 feet (15 m) and the total area between control joints does not exceed 2,500 SF.
      b. For interior ceilings without perimeter relief, control joints shall be installed so that linear dimensions between control joints shall not exceed 30 feet (9 m) and the total area between control joints does not exceed 900 SF.

c. Ceiling framing changes direction.
d. Ceiling abuts a structural member, dissimilar wall or partition, or other vertical penetration.
e. A ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
f. Ceiling control joint is desired or incorporated as a design accent or architectural feature.

3. Doorways, Borrowed Lite Frames, and Other Wall Openings:
a. Full-height frames or other full-height breaks in the wall surface are considered control joints.
b. Less-than-ceiling height frames/openings, provide control joints on both sides extending from top corners of frames/openings to top of wall.
c. Borrowed Lite Frames: Provide control joints extending down to the floor from bottom corners of frame, and extending up from top corners of frame to top of wall.

D. Control joints should be installed at weak points in framing where any movement might be expected.

E. Install control joints in face layer of gypsum board.

F. Align ceiling and soffit gypsum joints with wall gypsum joints where possible.

G. Form control joints with double studs with a space between board edges to receive control joint trim. Fasten control joint trim to gypsum panels, full length of trim at both sides of joint.

H. Where a control joint occurs in an acoustical or fire-rated system, blocking shall be provided behind the control joint by using a backing material such as 5/8 inch (15.9 mm) type X gypsum panel products, mineral fiber, or other tested equivalent. See the Gypsum Association's GA-600 or GA-234.

I. Control Joint Trim:
1. Product: USG; Model # CJA-75, or equivalent; aluminum Alloy 6063, 0.75 mm thickness; ASTM C645 and ASTM C955 compliant; or,
2. Product: USG; Model # CJS-45, or equivalent; G40-G90 galvanized steel, 0.45 mm thickness; ASTM A653/A653M compliant.

3.05 TRIM AND ACCESSORIES

A. Corner Beads: Install metal corner beads at external corners. Use longest practical lengths.

B. Install metal edge trim wherever edge of gypsum board is exposed or semi-exposed.
1. Provide L-type trim at locations where gypsum board abuts dissimilar materials.
2. Provide U-type trim where edge is exposed, revealed, gasketed, sealant filled, including expansion joints.
3. J-type trim is not permitted.

3.06 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.

B. Finish gypsum board in accordance with finish levels defined in ASTM C840:
1. LEVEL 4 - FINISH COAT: Joints and interior angles shall have tape embedded in joint compound and three separate coats of joint compound applied over joints, angles, fastener heads, and accessories. Joint compound shall be smooth and free of tool marks and ridges. Prepare surface to be coated with a primer/sealer prior to the application of final finishes. Typical finish level for all exposed gypsum board surfaces scheduled to receive paint finishes, and for surfaces covered with lightweight wallcovering.
2. LEVEL 3: FILL COAT: Joints and interior angles shall have tape embedded in joint compound and two separate coats of joint compound applied over joints, angles, fastener heads, and accessories. Joint compound shall be smooth and free of tool marks and

ridges. For surfaces that may receive a medium-to-heavy (knockdown) texture or heavyweight wall covering.

3. LEVEL 2: EMBED COAT: Joints and interior angles shall have tape embedded in joint compound and one separate coat of joint compound applied over joints, angles, fastener heads, and accessories. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable. Generally used above ceilings and in back-of-house areas, garages, and mechanical rooms.
    a. Fire-Taping: Where a fire-resistance rating is required for the gypsum board assembly, details of construction should be in accordance with reports of fire tests of assemblies that have met the requirements of the fire rating imposed.
4. LEVEL 1: Joints and interior angles shall have tape embedded in joint compound. Coverage of fastener heads, beads, and accessories is not required. Surfaces shall be free of excess joint compound. Tool marks and ridges are acceptable.
5. LEVEL 0: No taping, finishing, or accessories required. The drywall is erected and the work is then complete. Finish is generally used where the assembly is concealed, for temporary construction, or as base layers in multi-gypsum layered assemblies.

3.07 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09 21 16

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal partition, ceiling, and soffit framing.

B. Framing accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood blocking within stud framing.

B. Section 07 21 00 - Thermal Insulation: Acoustic insulation.

C. Section 07 84 00 - Firestopping: Sealing top-of-wall assemblies at fire-resistance-rated walls.

D. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

E. Section 09 21 16 - Gypsum Board Assemblies: Metal studs for gypsum board partition framing.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

B. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.

C. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2020.

1.04 SUBMITTALS

A. Shop Drawings:
   1. Indicate prefabricated work, component details, stud layout, framed openings, anchorage to structure, acoustic details, type and location of fasteners, accessories, and items of other related work.
   2. Describe method for securing studs to tracks, splicing, and for blocking and reinforcement of framing connections.

B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.

C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

B. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): www.ssma.com/#sle.

C. Manufacturer Qualifications: Member of Supreme Steel Framing System Association (SSFSA): www.ssfsa.com/#sle.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Framing, Connectors, and Accessories:
   1. ClarkDietrich: www.clarkdietrich.com/#sle.
   2. Jaimes Industries: www.jaimesind.com/#sle.
   3. Marino: www.marinoware.com/#sle.
   4. SCAFCO Corporation: www.scafco.com/#sle.
   5. Steel Construction Systems: www.steelconsystems.com/#sle.
   6. The Steel Network, Inc; _____: www.SteelNetwork.com/#sle.

7. Substitutions: See sec.

2.02 FRAMING MATERIALS

A. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
   1. Studs: C shaped with knurled or embossed faces.
      a. Products:
         1) MBA Building Supplies; ProSTUD: www.mbastuds.com/#sle.
         2) Super Stud Building Products, Inc; The EDGE: www.buysuperstud.com/#sle.
         3) Substitutions: See section 006325.

B. Partition Head to Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short and braced with continuous bridging on both sides.

C. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
   2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot-dipped galvanized coating.
   3. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
   4. Provide top track preassembled with connection devices spaced to fit stud spacing indicated on drawings; minimum track length of 12 feet.
      a. Products:
         1) ClarkDietrich; BlazeFrame RipTrak: www.clarkdietrich.com/#sle.
         2) Super Stud Building Products, Inc; Slotted Deflection Track: www.buysuperstud.com/#sle.
         3) Substitutions: See section 006325.

D. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
   1. Products:
      a. ClarkDietrich; BlazeFrame Firestop Deflection Track: www.clarkdietrich.com/#sle.
      b. Substitutions: See section 006325.

E. Preformed Top Track Firestop Seal:
   1. Provide components UL-listed for use in UL-listed fire-resistance-rated head of partition joint systems indicated on drawings.
   2. Products:
      a. Hilti, Inc; Top Track Seal CFS TTS: www.us.hilti.com/#sle.
      b. Specified Technologies Inc; SpeedFlex TTG Track Top Gasket: www.stfirestop.com/#sle.
      c. Substitutions: See section 006325.

F. Non-Loadbearing Framing Accessories:
   1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
   2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
      a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
      b. Height: 35-3/4 inches.
      c. Products:
         1) ClarkDietrich; Pony Wall (PW): www.clarkdietrich.com/#sle.

2) Substitutions: See section 006325.

3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.
   a. Products:
      1) ClarkDietrich; FastBridge Clip (FB33): www.clarkdietrich.com/#sle.
      2) Substitutions: See section 006325.
4. Anchorage Devices: Powder actuated.
5. Acoustic Insulation: As specified in Section 07 21 00.
6. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

2.03 FABRICATION

A. Fabricate assemblies of framed sections to sizes and profiles required.

B. Fit, reinforce, and brace framing members to suit design requirements.

C. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

3.02 INSTALLATION OF STUD FRAMING

A. Comply with requirements of ASTM C754.

B. Extend partition framing to structure where indicated and to ceiling in other locations.

C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs as indicated.

E. Align and secure top and bottom runners at 24 inches on center.

F. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.

G. Install studs vertically at 16 inches on center.

H. Align stud web openings horizontally.

I. Secure studs to tracks using crimping method. Do not weld.

J. Fabricate corners using a minimum of three studs.

K. Install double studs at wall openings, door and window jambs, not more than 2 inches from each side of openings.

L. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.

M. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.

N. Sound Isolation Clips: Mechanically attach to framing or structure with fasteners recommended by clip manufacturer. Install at spacing indicated on drawings.

3.03 CEILING AND SOFFIT FRAMING

A. Comply with requirements of ASTM C754.

B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.

C. Install furring independent of walls, columns, and above-ceiling work.

D. Securely anchor hangers to structural members or embed them in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.

E. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.

F. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.

3.04 TOLERANCES

A. Maximum Variation From True Position: 1/8 inch in 10 feet.

B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION 09 22 16

SECTION 09 30 00
TILING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Coated glass mat backer board as tile substrate.

1.02 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants

B. Section 09 05 61 - Common Work Results for Flooring Preparation

1.03 REFERENCE STANDARDS

A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2023.

B. ANSI A108.1b - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.

D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship; 2019.

E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.

F. ANSI A108.5 - Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue Plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar; 2023.

G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.

H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2024).

I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.

J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).

K. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units; 2023.

L. ANSI A108.12 - Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Modified Dry-Set Mortar; 2023.

M. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2021).

N. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar; 2020.

O. ANSI A108.20 - American National Standard Specifications for Exterior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs; 2020.

P. ANSI A108/A118/A136 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 2024.

Q. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2021.

R. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.

S. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2018.

T. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2025.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by affected installers.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, perimeter conditions, junctions with dissimilar materials, control and expansion joints, and setting details.

D. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Installer's Qualification Statement:
   1. Submit documentation of National Tile Contractors Association (NTCA) or Tile Contractors' Association of America (TCAA) accreditation.

G. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.

1.06 MAINTENANCE MATERIAL

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. See Section 006325, for additional provisions.
   2. Extra Tile: Furnish quantity of full-size units in unopened cartons, equal to not less than 3-percent of amount installed for each type, composition, color, pattern, and size indicated.

1.07 QUALITY ASSURANCE

A. Maintain one copy of ANSI A108/A118/A136 and TCNA (HB) on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.

C. Installer Qualifications:
   1. Company specializing in performing tile installation, with minimum of five years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.10 WARRANTY

A. Manufacturer Warranty: Manufacturer shall warrant the products specified in this Section against material defects or defects in manufacturing, for (1) year from the Date of Substantial Completion.

B. Installation Warranty: The installing subcontractor shall warrant the installation to be free of defects in material and workmanship for one (1) year from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 TILE

A. Manufacturers: Basis of Design: Virginia Tile as shown on interior finish legend. .
   1. Other Allowable Manufacturers:
      a. WOW USA
      b. Concept Surfaces
      c. Missouri Tile, Roca Tile

B. Ceramic Wall Tile:
   1. Ceramic Wall Tile, designated in the Drawings as Finish Type CWT- #.
      a. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.
   2. Type CWT-1:
      a. ANSI A137.1 standard grade.
      b. Moisture Absorption: Less than 20 percent as tested in accordance with ASTM C373.
      c. Size: As indicated on Drawings.
      d. Tile Thickness: 5/16 inch or 3/8 inch depending on size.
      e. Shape: Rectangle.
      f. Edges: Square.
      g. Surface Finish: As indicated on drawings.
      h. Color/s: As scheduled on drawings.
      i. Pattern: As indicated on Drawings.
      j. Metal Trim: Refer to Section 09 30 50, for requirements.
      k. Grout: GT-1.
      l. Grout Joint Width: 1/16 inch, unless indicated otherwise.
      m. Product: .
         1) Product: Dal-Tile Corporation; Color Wheel Linear: www.daltile.com/#sle.

2.02 TRIM AND ACCESSORIES

A. Metal Trim: Material, style and dimensions to suit application, for setting using tile mortar or adhesive.
   1. Refer to Section 09 30 50, for requirements.

2.03 SETTING MATERIALS

A. Provide setting and grout materials from same manufacturer.

B. Epoxy Adhesive and Mortar Bond Coat: ANSI A118.3.
   1. Applications: Where indicated on drawings.
   2. Product:
      a. Mapei Corporation; ; Kerapoxy Adhesive: www.mapei.com/#sle.

2.04 GROUT

A. GROUT, designated in the Drawings as FinishType GT- #.

1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. Provide setting and grout materials from same manufacturer.

C. Type GT- 1 and GT-2: Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
   1. Applications: Where indicated.
   2. Color/s: As scheduled.
   3. Product:
      a. Mapei; Ultracolor Plus FA: www.mapei.com/#sle.

2.05 ACCESSORY MATERIALS

A. Backer Board: Refer to Section 09 21 16, for requirements.

B. Backer Board: Coated glass mat type complying with ASTM C1178/C1178M; inorganic fiberglass mat on both surfaces and integral acrylic coating vapor retarder.

C. Mesh Tape: 2 inch wide self-adhesive fiberglass mesh tape.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.

C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.

D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH). Refer to Section 09 05 61, for requirements.
   1. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.
   2. Follow moisture and alkalinity remediation procedures in Section 09 05 61.

3.02 PREPARATION

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.03 INSTALLATION - GENERAL

A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.20, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles square.

F. Install metal trim in accordance with manufacturer's instructions.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep control and expansion joints free of mortar, grout, and adhesive.

I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

J. Grout tile joints unless otherwise indicated.

K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHOD

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 INSTALLATION - WALL TILE

A. Over coated glass mat backer board on metal studs, install in accordance with TCNA (HB) Method W245.

B. Over gypsum wallboard on metal studs install in accordance with TCNA (HB) Method W243, thin-set with dry-set or latex-Portland cement bond coat, unless otherwise indicated.

3.06 CLEANING

A. Clean tile and grout surfaces.

3.07 PROTECTION

A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 09 30 00

SECTION 09 30 50
METAL EDGE PROTECTION AND TRANSITION PROFILES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Edge protection and transition profiles for floors and walls.

1.03 RELATED REQUIREMENTS

A. Section 09 65 00 - Resilient Flooring and Accessories

B. Section 09 21 16 - Gypsum Board Assemblies

1.04 REFERENCE STANDARDS

A. Tile Council of North America (TCNA) Handbook for Ceramic Tile Installation.

B. American National Standard Specifications for the installation of ceramic tile A108 / A118 / A136.1.

1.05 DEFINITIONS

A. Metal Edge Protection and Transition Profiles from here on shall be referred to as "Edge Protection".

1.06 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and finish.

C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five-years experience.

B. Source Limitations for Setting Materials and Accessories: Obtain product of a uniform quality for each application condition from a single manufacturer.

1.08 DELIVERY, STORAGE, & HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.09 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 manufacturer's absolute limits.

1.10 COORDINATION

A. Coordinate Work with other operations and installation of floor finish materials to avoid damage to installed materials.

1.11 WARRANTY

A. Floor and Wall Profiles - Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from the Date of Substantial Completion.

B. Cove-Shaped Profiles - Limited Warranty: The manufacturer shall warrant the product against material defects, or defects in manufacturing, for five (5) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Schluter Systems
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
      a. Genesis APS International (P: / Web: www.genesis-gs.com)
      b. Futura Transitions (P: 800-824-2049 / Web: www.futuratransitions.com
   2. Substitutions: Not permitted.

2.02 EDGE PROTECTION - FLOORS

A. Edge Protection, designated in the Drawings as FinishType TRS- #
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. Type TRS-1: Schluter; SCHIENE
   1. Description: L-shaped profile with 1/8 inch (3.2 mm) wide visible surface integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   2. Application: Same height transition with minimum reveal.
   3. Anchoring Leg:
      a. Provide with straight anchoring leg.
   4. Material and Finish:
      a. AE - Satin Anodized Aluminum.
         1) Height as required to coordinate with tile selection and setting system selected.

C. Type TRS-2: Schluter-VINPRO-U
   1. Description: J-shaped profile with 1/4 inch (6 mm) or 7/16 inch (11 mm) wide visible surface and integrated perforated tapered anchoring leg.
   2. Application: Edge-protection and transition profiles for resilient coverings.
   3. Profile Height: As required to coordinate with tile selection and setting system.
   4. Material and Finish:
      a. ACGB: Brushed Chrome Anodized Aluminum.

2.03 EDGE PROTECTION - WALLS

A. WALL EDGE PROTECTION, designated in the Drawings as FinishType MT- #
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. Type MT-1: Schluter-JOLLY
   1. Description: L-shaped profile with 1/8 inch (3.2 mm) wide top section vertical wall section that together form the visible surface, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.
   2. Anchoring Leg:
      a. Provide with straight anchoring leg.
      b. Provide with special radius anchoring leg for radius applications.
   3. Material and Finish:
      a. AT - Satin Nickel Anodized Aluminum.
         1) Height as required to coordinate with tile selection and setting system selected.

2.04 COVE-SHAPED PROFILES

A. COVED-SHAPED PROFILES, designated in the Drawings as Finish Type MT- #.

B. Type MT-1: Schluter-DILEX-AHK

1. Description: Profile with integrated trapezoid-perforated anchoring legs, connected at a 90-degree angle by a cove shaped section with 3/8 inch (10 mm) radius that forms the visible surface.
2. Corners:
    a. Provide with matching inside corners.
    b. Provide with matching outside corners.
    c. Provide with matching end caps.
    d. Provide with matching connectors.
3. Material and Finish:
    a. AE - Satin Anodized Aluminum.
        1) Height as required to coordinate with tile selection and setting system selected.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 09 30 50

SECTION 09 51 00
ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Provide data on suspension system components and acoustical units.

C. Samples: Submit two full size samples illustrating material and finish of acoustical units.

D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

E. Manufacturer's Qualification Statement.

1.06 EXTRA MATERIALS

A. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. Extra Acoustical Units: Quantity equal to 5 percent of total installed.

1.07 QUALITY ASSURANCE

1.08 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustical Panels and Suspension Systems:
   1. Basis of Design: Armstrong Industries as shown on Finish schedule

B. Other allowable Manufacturers:
   1. Armstrong World Industries, Inc: www.armstrongceilings.com/#sle.
   2. CertainTeed Corporation; ____: www.certainteed.com/#sle.
   3. USG Corporation; ____: www.usg.com/ceilings/#sle.

2.02 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Ceiling systems designed to withstand the effects of earthquake motions determined according to ASCE 7 for Seismic Design Category Category B, and complying with the following:
   1. Local authorities having jurisdiction.

2.03 ACOUSTICAL PANELS

A. Acoustical Panels, designated in the Drawings as FinishType ACT- #.
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

2.04 SUSPENSION SYSTEM(S)

A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
   1. Materials:
      a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
      b. Aluminum Grid: Aluminum sheet, ASTM B209/B209M.

B. Ceiling Grid and Trim for Type ACT-1 Thru ACT-5 Acoustical Ceilings:
   1. Product: Armstrong; Prelude XL 15/16" Exposed Tee
   2. Profile: Exposed Tee; 15/16 inch wide face.
   3. Structural Classification: ASTM C635/C635M, Heavy Duty duty
   4. Suspension System: Armstrong; Seismic Rx (IBC Category C)
   5. Finish: Baked polyester paint.
      a. Color: White.
   6. Grid Module: Varies by panel size

2.05 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.

C. Hold-Down Clips: Manufacturer's standard clips to suit application.

D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.

E. Perimeter Moldings: Same metal and finish as grid.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

3.02 PREPARATION

A. Install after major above-ceiling work is complete.

B. Coordinate the location of hangers with other work.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

B. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.

C. Seismic Suspension System, Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch clearance between grid ends and wall.

D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

F. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

G. Do not eccentrically load system or induce rotation of runners.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Make field cut edges of same profile as factory edges.

3.05 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 09 51 00

SECTION 09 65 00
RESILIENT FLOORING AND ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile flooring.

C. Resilient base.

D. Resilient stair accessories.

E. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.

B. Section 09 05 61 - Common Work Results for Flooring Preparation:

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2019a, with Editorial Revision (2020).

B. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile; 2020.

C. ASTM F1861 - Standard Specification for Resilient Wall Base; 2021.

D. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2023.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

D. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of subfloor is acceptable.

F. Installer's Qualification Statement.

G. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

H. Maintenance Materials.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing specified flooring with minimum three years documented experience.

B. Testing Agency Qualifications: Independent firm specializing in performing concrete slab moisture testing and inspections of the type specified in this section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store all materials off of the floor in an acclimatized, weather-tight space.

1.07 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 TILE FLOORING

A. Luxury Vinyl Tile: Solid vinyl with color and pattern throughout thickness.
   1. Luxury Vinyl Tile, designated in the Drawings as FinishType LVT- #.
      a. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, and other related information.
   2. Other allowable Manufacturers:
      a. Patcraft
      b. J+J Flooring
      c. Tarkett Flooring
   3. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
   4. Total Thickness: 0.125 inch.

2.02 RESILIENT BASE

A. Resilient Base, designated in the Drawings as FinishType RB- #.
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. Resilient Base - Type RB-1 and RB-3: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
   1. Manufacturers:
      a. Johnsonite, a Tarkett Company: www.johnsonite.com/#sle.
      b. Mannington Commercial; _____: www.manningtoncommercial.com#sle.
      c. Roppe Corporation; Contours Profiled Wall Base System: www.roppe.com/#sle.

C. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
   1. Height: As scheduled.
   2. Finish: Satin.
   3. Length: Roll.
   4. Color: As indicated on drawings.
   5. Accessories: Premolded external corners and internal corners.

2.03 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

C. Adhesive for Vinyl Flooring:

D. Moldings, Transition and Edge Strips: Same material as flooring.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.

B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is fully cured.

3.03 INSTALLATION - GENERAL

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:
   1. Spread only enough adhesive to permit installation of materials before initial set.
   2. Place copper grounding strip in conductive adhesive and apply additional adhesive to top side of strip before installing static control flooring. Allow strip to extend beyond flooring in accordance with static control flooring manufacturer's instructions. Refer to Section 26 05 26 for grounding and bonding to building grounding system.
   3. Fit joints and butt seams tightly.
   4. Set flooring in place, press with heavy roller to attain full adhesion.

D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
   1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
   2. Resilient Strips: Attach to substrate using adhesive.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

B. Lay flooring with joints and seams parallel to building lines to produce symmetrical pattern.

C. Install loose-laid tile, fit interlocking edges tightly.

D. Install plank tile with a random offset of at least 6 inches from adjacent rows.

3.05 INSTALLATION - RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.06 INSTALLATION - STAIR COVERINGS

A. Install stair coverings in one piece for full width and depth of tread.

B. Adhere over entire surface. Fit accurately and securely.

3.07 FIELD QUALITY CONTROL

A. Manufacturers Field Services and Reports:
   1. Field Visits: The resilient flooring product manufacturers will provide a qualified and trained auditor to perform at least two (2) field visits during the installation of the resilient flooring.

2. The auditor shall inspect the condition of surfaces; the progress of the installation; the quality of workmanship; and initiate instructions to the Contractor when necessary.
3. Any corrective action deemed necessary to comply with the manufacturer's specifications must be completed prior to the final inspection.
4. Prepare field reports, and submit them to the Contractor, Owner, and Architect.

B. Remove and replace resilient flooring work if inspections indicate that it does not comply with specified requirements.

C. Additional field visits, at the Contractor's expense, will be performed to determine compliance of repair work with specified requirements.

3.08 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

C. Seal, and wax resilient flooring products in accordance with the manufacturer's instructions.
1. Provide four (4) coats of wax on resilient tile surfaces.

3.09 PROTECTION

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Protect installed Work with Kraft paper or other heavy covering during the remainder of construction to prevent staining, damage, and wear.

END OF SECTION 09 65 00

SECTION 09 68 13
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Walk-off carpet

B. Modular carpet ti

C. Textile Composite Flooring

1.02 RELATED REQUIREMENTS

A. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.

B. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

B. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

C. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.

D. Installer's Qualification Statement.

E. Operation and Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

F. Maintenance Materials.
   1. Extra Carpet Tiles: Unopened boxes, Quantity equal to no less than 5 percent of total installed of each color and pattern installed.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.06 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Per Finish Schedule in Drawings.

B. Other Allowable Manufacturers:
   1. EF Contract
   2. J+J Flooring
   3. Patcraft

2.02 WALK-OFF CARPET TILE

A. Walk-Off Carpet Tile, designated in the Drawings as Finish Type WOC- #.
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. Type WOC-1:
   1. Manufacturer: As scheduled
   2. Product: As scheduled
   3. Module Size: As scheduled.

4. Tile Format: Square.
5. Tile Thickness: Per manufacturer
6. Color: As scheduled
7. Installation Method: As scheduled
8. Adhesive: Full spread or pre-applied

2.03 TEXTILE COMPOSITE FLOORING

A. Textile Composite Flooring, designated in the Drawings as Finish Type TCF- #.
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. Other Allowable Manufacturers:
   1. EF Contract
   2. Forbo (Flotex Product)

2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.

B. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
   1. Test in accordance with Section 09 05 61.
   2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
   3. Follow moisture and alkalinity remediation procedures in Section 09 05 61.

3.02 PREPARATION

A. Prepare floor substrates for installation of flooring in accordance with Section 09 05 61.

B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.

C. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of subfloor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Locate change of color or pattern between rooms under door centerline.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION 09 68 13

SECTION 09 69 23
SEAMLESS RESINOUS FLOOR COVERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Seamless resinous floor covering and integral base.

1.03 RELATED REQUIREMENTS

A. Section 09 05 61 - Common Work Results for Flooring Preparation

B. Section 09 21 16 - Gypsum Board Assemblies

1.04 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.

B. Shop Drawings: Submit details of construction; including the relationship with adjacent construction.

C. Selection Samples: For each finished product specified complete sets of color chips representing the manufacturer's full range of available colors and patterns.
   1. Submit manufacturer's standard color chart. Computerized custom color matching shall be available upon request. Furnish two (2) sets of samples for review and selection.

D. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square representing actual product, color, and patterns.
   1. Submit a cured system sample which the Contractor has made for verification purposes and finish texture approval.

E. Maintenance Data: For maintenance manuals.

1.05 INFORMATION SUBMITTALS

A. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

B. Material Certificates: For each resinous flooring component, from the manufacturer.

C. Material Test Reports: For each resinous flooring system.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain materials from a single manufacturer with a minimum of five years of experience providing materials of the type specified in this section.

B. Installer Qualifications:
   1. Installation shall be performed by a manufacturer-approved installer with skilled mechanics having not less than three years satisfactory experience in the installation of the type of system as specified in this section, and shall be approved in writing by the manufacturer of the seamless flooring systems.

C. Source Limitations: Obtain primary resinous materials, including primers, resins, hardening agents, grouting coats, and topcoats, from a single manufacturer. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by the manufacturer of primary materials.

1.08 PRE-INSTALLATION MEETINGS

A. Convene pre-installation meeting at least two weeks before starting work of this Section.

1.09 DELIVERY, STORAGE & HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Store materials following the manufacturer's instructions, with seals and labels intact and legible. Maintain temperatures within the required range. Do not use materials that exceed the manufacturer's maximum recommended shelf life.

C. Handle materials to avoid damage.

1.10 PROJECT CONDITIONS

A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.

B. The Contractor shall visit the Jobsite before the installation of the seamless flooring systems to evaluate substrate condition, including substrate moisture transmission, quantity and severity of cracking, and the extent of repairs needed. Substrate imperfections should be repaired only after the mechanical preparation of the substrate. Surface preparation reveals most imperfections requiring repair. Concrete substrates shall be tested to verify that the moisture vapor transmission of the substrate does not exceed the manufacturers' recommendations.

C. Concrete subfloor tolerances shall be in accordance with ACI 302. Each drain in the installation area shall be working and raised or lowered to the actual finished elevation of the seamless flooring.

D. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during the application of seamless flooring systems.

E. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application unless the manufacturer recommends a longer period.

1.11 WARRANTY

A. Installation Warranty: The Contractor shall warrant the installation to be free of defects in material and workmanship for two (2) years from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Desco Coatings, Inc.
   1. Other Allowable Manufacturers:
      a. Treadwell
      b. Stonhard

2.02 SEAMLESS FLOOR COVERING

A. Seamless Floor Covering, designated in the Drawings as Finish Type RES- #
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other information.

B. Type RES-1:
   1. Product: Desco; Quartz Cremona Series, "Cremona TG"
      a. Description: Abrasion-, impact- and chemical-resistant, decorative-aggregate-filled, epoxy-resin-based, monolithic floor covering designed to produce a seamless installation.
      b. Overall System Thickness: 1/4-inch (6.4 mm).
      c. Surface Texture: Standard Slip Resistant
      d. Color: As scheduled.
   2. Provide turned-up cove base with 1-inch radius cove as indicated in Article 2.03.

3. Application Method: Hand troweled
    a. Thickness/ Number of Coats: 2 @ 1/8 inch (3.2 mm)
    b. Overall System Thickness: 1/4-inch (6.4 mm)
4. No broadcasting of aggregate allowed
5. Minimum Performance Characteristics:
    a. Compressive Strength (ASTM C579): 12,000 psi
    b. Tensile Strength (ASTM C 307): 2,850 psi
    c. Flexural Strength: 4,000 psi
    d. Shore D Hardness (ASTM D2240): 85-90
    e. Abrasion Resistance (ASTM D4601/D4601M): 0.080 mg
    f. Bond Strength (ASTM D4541): 425 psi
6. Flame Spread (ASTM E84): Flame Spread: Below 25; Smoke Development: 100. Results shall be rated as Class A.
7. Chemical Resistance: Test specimens of cured seamless flooring and wall system are unaffected when tested according to the following reagents for no fewer than 21 days: 20% Hydrochloric Acid, Urine, Coffee, Ethyl Alcohol, 10% Lactic Acid, Tea, Mustard, Mercurochrome, or Betadine.
8. Epoxy topcoats shall produce no color shift after exposure to fluorescent lighting on the “b” axis yellow index after 3 weeks of exposure.
9. Materials:
    a. Primer: Type recommended by the manufacturer for substrate and system indicated.
        1) Formulation: 100% solids.
    b. Body Coats: 100% solids clear/epoxy resin
    c. Aggregates: Manufacturer's standard Colored quartz (ceramic-coated silica) to be used to achieve all colors. No pigmented epoxy base or topcoats allowed
    d. Grout Coat: 100% solids clear/epoxy resin.
10. Topcoat: Sealing or finish coats.
    a. Resin: Urethane.
    b. Formulation Description: As recommended by the manufacturer for the desired effect
    c. Color: Clear.
    d. Number of Coats: One or two as may be required for desired finish texture

2.03 SEAMLESS COVE BASE

A. Seamless Cove Base, designated in the Drawings as Finish Type IB- #
    1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other information.

B. Type IB-1:
    1. Product: Same as Type RES-1
        a. Provide a 1-inch radius cove to transition from the seamless floor covering to the other wall finishes.
            1) Apply cove base mix to wall surfaces before applying the resinous flooring.
            2) Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top coating of cove base.
                (a) Round internal and external corners.
                (b) Height: 6-inches

2.04 ACCESSORIES

A. Primer: Type recommended by the manufacturer for substrate and body coats indicated.

B. Reinforcing Membrane: Flexible resin formulation that is recommended by the manufacturer for substrate and primer and body coats indicated and that prevents substrate cracks from reflecting through resinous flooring.
    1. Formulation Description: As recommended by the manufacturer.
        a. Provide fiberglass scrim embedded in the reinforcing membrane.

C. Patching and Fill Material: Resinous product of or approved by the manufacturer and recommended by the manufacturer for application indicated.

D. Seamless Floor around Kitchen grills, fryers, etc., as noted on the plan, shall receive a Desco Industrial UT flooring system of a solid color troweled down, for superior hot grease resistance, as required, in matching thickness.

E. Binder and all successive grout and topcoats shall be 100% solids clear/epoxy resin. Ceramic coated quartz aggregates are to be used to achieve all colors. No pigmented epoxy base or topcoats are allowed.

F. Final topcoat material and texture shall be determined by reviewing material samples with ranges of texture. Urethane UV resistant clear topcoat with approved grit and quantity shall be applied to all areas unless otherwise noted.

PART 3 - EXECUTION

3.01 TESTING OF CONCRETE SUBSTRATE

A. Refer to Section 09 05 61, for requirements to determine moisture content, relative humidity, and alkalinity of the concrete substrate at the time of application.

3.02 PREPARATION

A. Prepare and clean substrates according to manufacturer's written instructions for substrate indicated. Provide clean, dry substrate for seamless flooring application.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous systems.
   1. Roughen concrete substrates as follows:
      a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
      b. Comply with ASTM C811 requirements unless the manufacturer's written instructions are more stringent.
   2. Repair damaged and deteriorated concrete according to manufacturer's written instructions.

C. Resinous Materials: Mix components and prepare materials according to the resinous flooring manufacturer's written instructions.

D. Use patching and fill material to fill holes and depressions in substrates according to the manufacturer's written instructions.

E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through seamless flooring and wall, according to the manufacturer's written instructions.

3.03 APPLICATION

A. Apply primer over the prepared substrate at the manufacturer's recommended spreading rate.

B. Apply a waterproofing membrane, where indicated, in the manufacturer's recommended thickness.
   1. Apply waterproofing membrane to integral cove base substrates.

C. Applying reinforcing membrane only to substrate cracks.

D. Apply reinforcing membrane to substrate cracks.

E. Application of Seamless Floorcovering:
   1. Apply components of seamless floor covering according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
      a. Coordinate application of components to provide optimum adhesion of resinous system to the substrate, and optimum intercoat adhesion.
      b. Cure resinous flooring components according to the manufacturer's written instructions. Prevent contamination during application and curing processes.

c. At substrate expansion and isolation joints, comply with the manufacturer's written instructions.

2. Apply troweled body coats in thickness indicated for flooring system. Hand trowel and grout to fill voids. Build-up slopes in flooring as required to drain, with smooth transitions, as indicated on plans. When cured, remove trowel marks and roughness using the method recommended by the manufacturer.

F. Seamless Cove Base: Apply cove base mix to wall surfaces before applying the resinous flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, troweling, sanding, and top coating of cove base. Round internal and external corners.

1. Cove Base Height: 6 inches.

3.04 FIELD QUALITY CONTROL

A. Material Sampling: The Owner may at any time and any number of times during resinous flooring application require material core samples for testing for compliance with requirements.

1. The Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified, sealed, and certified in presence of the Contractor.
2. The testing agency will test samples for compliance with requirements, using applicable referenced testing procedures, or, if not referenced, using testing procedures listed in the manufacturer's product data.
3. If test results show applied materials do not comply with specified requirements, pay for testing, remove non-complying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.05 PROTECTION

A. Protect resinous flooring from damage and wear during the remainder of the construction period. Use protective methods and materials, including temporary covering, recommended in writing by the resinous flooring manufacturer.

END OF SECTION 09 69 23

SECTION 09 84 14
ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS - NOVAWALL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acoustic stretched-fabric wall system.

B. Acoustic stretched-fabric ceiling system.

C. Accessories as required for complete installation.

1.02 REFERENCE STANDARDS

A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.

B. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2022.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

D. ASTM E795 - Standard Practices for Mounting Test Specimens during Sound Absorption Tests; 2023.

E. ASTM E2573 - Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics; 2024.

1.03 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.

C. Shop Drawings: Details indicating typical transitions to other finish surfaces.

D. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.

E. Test Reports: Certified test data from an independent test agency verifying that ceiling systems meet specified requirements for acoustical and fire performance.

F. Installer's Qualification Statement.

G. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling.

B. Do not deliver materials to project until wet work such as concrete and plaster has been completed.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy.

B. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.07 WARRANTY

A. Correct defective work within five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Acoustic Stretched-Fabric Ceiling System:
   1. Novawall Systems, Inc: www.novawall.com/#sle.
   2. FabriTRAK Systems, Inc;[____]: www.fabritrak.com/#sle.
   3. FabriTRAK Systems, Inc;[____]: www.fabritrak.com/#sle.
   4. Substitutions: See section 006325.

2.02 ACOUSTIC STRETCHED-FABRIC SYSTEM

A. Acoustic Stretched-Fabric Ceiling System: Field installed, fabric is stretched and set into framework and laid over acoustic material anchored to substrate. Framework consists of continuous perimeter and intermediate mounting frames anchored to substrate, and designed to permit removal and replacement of fabric within framed areas without affecting adjacent areas.
   1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
   2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423, Type A mounting per ASTM E795.
   3. Prefabricated, fabric covered and individually framed panels are not permitted.
   4. Install fabric over acoustic material and into framework without use of adhesives, tapes, or fasteners.
   5. Seams in fabric are not permitted; base the frame layout dimensions on fabric at least 72 inch wide.

2.03 MATERIALS

A. Frame: Extruded polymer framing system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.
   1. Ceiling Frame Size: 1-3/8 inch height from ceiling substrate with minimum 1 inch wide base.

B. Acoustic Material:
   1. Provide type of acoustic material in thickness required to achieve Noise Reduction Coefficient (NRC) indicated.
   2. Compressed Fiberglass Board: Class A fire rated in accordance with ASTM E84.
      a. Overall Thickness: As indicated on drawings.
      b. Panel Size and Configuration: As indicated in Drawings.
   3. Multi-Density Fiberglass Board: Class A fire rated in accordance with ASTM E84.
      a. Overall Thickness: As indicated on drawings .

C. Rigid Blocking: Fire-retardant treated medium density fiberboard complying with ANSI A208.2, in thickness to meet project requirements.

D. Fabric: Heavy-duty fire-retardant commercial fabric, as provided by manufacturer of acoustic stretched-fabric system; color, pattern, and texture as selected from system manufacturer's fabric supplier's standard line of fabric.

E. Fasteners: As recommended by manufacturer of acoustic stretched-fabric system in accordance with project requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Begin installation only after substrates have been properly prepared.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation of this work.

B. Prepare substrate surfaces using methods as recommended by the manufacturer for achieving acceptable result as required for this work.

3.03 INSTALLATION

A. Install acoustic stretched-fabric system at ceiling locations indicated in accordance with approved shop drawings and manufacturer's instructions.

B. Frames: Install perimeter and intermediate frames using appropriate fasteners for prepared substrate, firmly secured to ensure frames do not separate from substrate.
   1. Install framing around openings and penetrations.
   2. Allow for spacing of framework to accommodate insertion of installation tool.

C. Acoustic Material: Cut and trim acoustic material to fit snugly within perimeter and intermediate framework.
   1. Apply adhesive and press acoustic material into place, maintaining constant plane.
   2. Staple acoustic material as necessary to prevent air gaps and to maintain secure contact for full adhesion to substrate.

D. Fabric: Stretch fabric over acoustic material, locking edges of fabric into frame's serrated jaws using manufacturer's recommended tool. Maintain fabric weave plumb, level and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.
   1. Upon fabric installation, do not employ adhesives or mechanical fasteners of any type, and ensure fabric is free-floating and in contact with acoustic material as necessary.
   2. Stapling or gluing of fabric to cores or channel framework is not permitted.
   3. Provide tension in fabric sufficient to prevent sagging under anticipated changes in temperature and humidity.
   4. At ceiling applications, surface of fabric shall not deviate from established ceiling plane more than 1 inch in 20 feet.

3.04 CLEANING

A. Clean exposed surfaces of acoustic stretched-fabric system in compliance with manufacturers instructions for cleaning and repair of minor damage to exposed surfaces.

B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of any damage to system.

3.05 PROTECTION

A. Protect installed materials upon completion of this work, using methods that will ensure that the finished work is without damage or deterioration upon Date of Substantial Completion.

END OF SECTION 09 84 14

SECTION 09 90 00
PAINTING AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Interior painting and coating systems.

C. Exterior painting and coating systems.

D. Scope:

1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
    a. Exterior:
        1) Masonry: Concrete masonry units (CMU), cinder or concrete block.
        2) Metal: Aluminum, galvanized.
        3) Wood: Decks, exterior including pressure treated lumber, non-vehicular floors and platforms.
        4) Wood: Siding, trim, shutters, sashes, and hardboard-bare/primed.
        5) Architectural PVC, plastic, and fiberglass.
        6) Drywall: Gypsum board and exterior drywall.
    b. Interior:
        1) Concrete, Walls: Poured concrete, precast concrete, unglazed brick, cement board, tilt-up, cast-in-place concrete, and plaster.
        2) Concrete, Ceilings: Poured concrete, precast concrete, cement board, cast-in-place concrete, and plaster.
        3) Concrete Masonry Units (CMU): Concrete block, split face, scored, smooth, high density, low density, and fluted.
        4) Metal: Aluminum and galvanized.
        5) Metal, Galvanized: Ceilings and ductwork.
        6) Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and ferrous metal.
        7) Wood: Walls, ceilings, doors, and trim.
        8) Drywall: Walls, ceilings, gypsum board, and similar items.
        9) Concrete: Floors, non-vehicular.

1.02 REFERENCE STANDARDS

A. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.03 SUBMITTALS

A. See Section 01 33 00 - Submittal Procedures

B. Product Data: Provide complete list of products to be used, with the following information for each:

1. Product characteristics.
2. Surface preparation instructions and recommendations.
3. Primer requirements and finish specification.
4. Storage and handling requirements and recommendations.
5. Application methods.
6. Clean-up information.

C. Samples: Submit two (2) paper 'drawdown samples', 8-1/2 by 11 inches in size, illustrating the range of colors available for each finishing product specified.

1. Where sheen is specified, submit samples in only that sheen.
2. Where sheen is not specified, submit each color in each sheen available.
3. Allow 30 days for the approval process, after receipt of complete samples by the Architect.

a. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory-finished metals, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Applicator's qualification statement.

F. Maintenance Data: Submit coating maintenance manual including finish schedule showing where each product/color/finish was used, product technical datasheets, safety data sheets (SDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

1.04 CLOSEOUT SUBMITTALS

A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating the location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.05 EXTRA MATERIALS

A. Deliver extra paint material/s for the Owner's use in maintenance. Label and store as directed by the Owner, including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials

B. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store at a location where directed by the Owner.
   1. Label each container with color in addition to the manufacturer's label.
   2. Include one copy of the Interior Finish Schedule with the paint material.
   3. Include MSDS information for all materials delivered.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with a minimum ten years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with a minimum of 5-years experience and approved by the manufacturer.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.

D. Coordination:
   1. Provide finish coats that are compatible with the prime coats actually used.
   2. Review other Sections of these Specifications as required, verifying the primer coats to be used and assuring compatibility of the total coating system for the various substrate.
   3. Furnish information on the characteristics of the specific finish materials to assure that compatible primer coats are used.
   4. Provide barrier coats over non-compatible primers, or remove the primer and re-prime as required.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.

C. Paint Materials: Store at a minimum of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

D. Handling: Maintain a clean, dry storage area to prevent contamination or damage to materials.

1.08 MATERIAL DISPOSAL

A. Never pour leftover coating down any sink or drain. Use up material on the job or seal can and store it safely for future use.

B. Do not incinerate closed containers.

C. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

1.09 FIELD CONDITIONS

A. Do not apply materials when environmental conditions (temperature, humidity, and ventilation) are outside the ranges required by the manufacturer.

B. Follow manufacturer's recommended procedures for producing the best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide a lighting level of 80 ft candles measured mid-height at the substrate surface.

1.10 WARRANTY

A. Manufacturer Warranty: The manufacturer shall warrant the products specified in this Section against material defects or defects in manufacturing, for a period of one (1) year from the Date of Substantial Completion.

B. The painting contractor shall furnish a guarantee to repair or replace any or all work which is found to be defective in workmanship or materials, together with any adjacent work disturbed by rectifying the defective work, for two (2) years from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design: Products from the Sherwin-Williams Paint Company are specified to establish the significant qualities related to type, function, in-service performance, physical properties, and appearance.
   1. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
      a. Benjamin Moore
      b. PPG Paints
   2. Products of other manufacturers with equivalent products to the specified manufacturer will be considered following the “or equal” provision specified in Section 006325 – Product Requirements.
      a. Product Substitutions: Comply with the requirements specified in Section 006325 - Substitution Procedures.

2.02 PAINTINGS AND COATINGS, GENERAL

A. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application.

B. Volatile Organic Compound (VOC) Content:
   1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
      a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.

C. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.03 MIXING AND TINTING

A. Paints and Finishes: Ready-mixed, unless intended to be a field-catalyzed paint.

B. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

C. Unless noted otherwise, a typical paint system consists of:
   1. One (1) Coat of Primer/ Filler
   2. One (1) Intermediate Coat

3. One (1) Top Coat

D. Tinting of Paint Finishes: Tint each coat as follows:
   1. Primer Coat: Do NOT tint primer coat.
   2. Intermediate Coat/s: Tint intermediate coat/s as the base color, applied to match the topcoat sheen.
   3. Top Coat: Final finish coat shall be applied as the base color with the specified sheen.

E. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in the manufacturer's product instructions.

2.04 PAINT FINISHES

A. Paint Finishes are designated in the Drawings as Finish Type PT-1
   1. Refer to the "Interior Finish Legend" for paint color designations, names, reference numbers, and sheen callouts.

2.05 EXTERIOR PAINT SYSTEMS

A. Masonry: Concrete masonry units (CMU) as indicated in the drawings:
   1. Latex Systems:
      a. Semi-Gloss Finish:
         1) 1st Coat: Sherwin-Williams PrepRite Block Filler, B25W25: www.sherwin-williams.com/#sle.
            (a) 75 to 125 sq ft/gal.
         2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Acrylic Semi-Gloss, B66-650 series: www.sherwin-williams.com/#sle.
            (a) 6 to 12 mils wet, 2 to 4 mils dry per coat.

B. Exterior Ferrous and Non-Ferrous (Galvanized) Metal: Provide the following finish systems over exterior metal substrates, if indicated in the drawings:
   1. Pre-Catalyzed Waterbased Epoxy System:
      a. Uses: Metal doors, metal door frames, and miscellaneous metals, as indicated in the drawings:
      b. Semi-Gloss Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial™ Pro-Cryl® Universal Primer, B66-1310 Series
            (a) Galvanized Metal Surfaces: Chemically treat with a compound designed for this purpose, in accordance with the manufacturer’s directions before applying the first coat of primer.
            (b) Shop Primed Surfaces: Except for “touch-up”, the prime coat may be omitted.
         2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial™ Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46-1150 Series
   2. Alkyd Systems, Water Based:
      a. Uses: Handrails and Guards
      b. Semi-Gloss Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series
            (a) Galvanized Metal Surfaces: Chemically treat with a compound designed for this purpose in accordance with the manufacturer’s directions before applying the first coat of primer.
            (b) Shop Primed Surfaces: Except for “touch-up” prime coat may be omitted.
            (c) 5 mils wet, 2 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series
            (a) 4 to 5 mils wet, 1.4 to 1.7 mils dry per coat.

2.06 INTERIOR PAINT SYSTEMS

A. Ferrous Metal Substrates: Includes, but is not limited to, interior metal doors, door frames, and miscellaneous metals, as indicated in the drawings:
   1. Pre-Catalyzed Water-Based Epoxy Systems:
      a. Uses: Interior metal doors, door frames, and miscellaneous metals
      b. Semi-Gloss Finish:
         1) Primer: Pro Industrial™ Pro-Cryl® Universal Primer, B66-310 Series
            (a) Shop Primed Surfaces: Except for “touch-up,” prime coat may be omitted. Verify compatibility and application of finish coat over shop primer with the paint manufacturer.
         2) Intermediate Coat: Pro Industrial™ Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 Series
         3) Top Coat: Pro Industrial™ Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 Series

B. Non-Ferrous (Galvanized) Metal Substrates:
   1. Epoxy Systems, Water Based:
      a. Semi-Gloss Finish:
         1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series
            (a) 5 mils wet, 2 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46 Series
            (a) 4 mils wet, 1.5 mils dry per coat.

C. Gypsum Board (Drywall): Walls and ceilings as indicated on the drawings
   1. Latex Systems:
      a. Eg-Shel Finish (walls on):
         1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600
            (a) 4 mils wet, 1.5 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series
            (a) 4 mils wet, 1.7 mils dry per coat.
      b. Flat Finish (ceilings and soffits only):
         1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600
            (a) 4 mils wet, 1.5 mils dry per coat.
         2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Latex Flat, B30-2600 Series
            (a) 4 mils wet, 1.6 mils dry per coat.

D. Concrete Floors: Light-Duty Industrial Floors, non-vehicular.
   1. Acrylic Systems:
      a. Semi-Gloss Finish:
         1) 1st Coat: ArmorSeal® Tread-Plex™ Water-Based Acrylic Primer, B90 Series
         2) 2nd Coat: ArmorSeal® Tread-Plex™, B90 Series
         3) 3rd Coat: ArmorSeal® Tread-Plex™, B90 Series

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove mildew from impervious surfaces by scrubbing with a solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow the surface to dry.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, before preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Ferrous Metal:
   1. Solvent clean according to SSPC-SP 1.
   2. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.

3.03 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions.

C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.

D. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.

E. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

F. Do not paint over labels of independent testing agencies, or equipment name, identification, performance rating, or nomenclature plates.

G. Primers specified in painting schedules may be omitted on items that are factory-primed or factory finished if acceptable to topcoat manufacturers.

H. Where adjacent sealant is to be painted, do not apply finish coats until the sealant is applied.

I. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before the next coat is applied.

J. Apply each coat to a uniform appearance in thicknesses specified by the manufacturer.

K. Dark Colors and Deep Clear Colors: Regardless of the number of coats specified, apply as many coats as necessary for complete hide.

L. Prime surfaces to receive wall coverings.

3.04 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: The Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
   1. The contractor shall touch up and restore painted surfaces damaged by testing.
   2. If test results show that the dry film thickness of applied paint does not comply with the paint manufacturer's written recommendations, the Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with the paint manufacturer's written recommendations.

3.05 DEFECTIVE WORK

A. Painted interior surfaces shall be considered to lack uniformity and soundness if any of the following defects are apparent upon inspection:
   1. Brush/roller marks, streaks, laps, runs, sags, drips, heavy stippling, hiding or shadowing by inefficient application methods, skipped or missed areas, and foreign materials in paint coatings.

2. evidence of poor coverage at rivet heads, plate edges, lap joints, crevices, pockets, corners, and re-entrant angles.
3. Damage due to touching before paint is sufficiently dry or any other contributory cause.
4. Damage due to application on moist surfaces or caused by inadequate protection from the weather.
5. Damage and/or contamination of paint due to blown contaminants (dust, spray paint, etc.).

B. Painted surfaces shall be considered unacceptable if any of the following are evident under daylight conditions for exterior surfaces:
1. Visible defects are evident on vertical surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39”).
2. Visible defects are evident on horizontal surfaces when viewed at normal viewing angles from a distance of not less than 1000 mm (39”).
3. Visible defects are evident on the ceiling, soffit, and other overhead surfaces when viewed at normal viewing angles.
4. When the final coat on any surface exhibits a lack of uniformity of color, sheen, texture, and hiding across the full surface area.

3.06 REPAIR

A. After construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.07 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Clean surfaces immediately of overspray, splatter, and excess material.

C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.08 PROTECTION

A. Provide “Wet Paint” signs to protect newly painted finishes.

B. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from the Project site.

C. Protect work of other trades against damage from the painting work by providing surface-applied protection before preparation and painting. After completing painting operations, remove temporary protective wrappings.

D. Protect finished coatings from damage until completion of project.

E. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 90 00

SECTION 099413 – TEXTURED ACRYLIC COLOR SUFACING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and application of textured surfacing for asphalt sport courts and similar play areas.

1.2 RELATED SECTIONS

A. References
   1. National Asphalt Paving Association (NAPA)
   2. American Concrete Institute (ACI)
   3. American Sport Builders Association (ASBA)

1.3 QUALITY ASSURANCE

A. If intended for competitive sports use, surfacing shall conform to the guidelines of the ASBA for planarity.

B. All surface coatings products shall be supplied by a single manufacturer.

C. The contractor shall record the batch number of each product used on the site and maintain it through the warranty period.

D. The contractor shall provide the inspector, upon request, an estimate of the volume of each product to be used on the site.

E. The installer shall be an authorized applicator of the specified system.

F. The manufacturer’s representative shall be available to help resolve material questions.

G. If concrete, concrete shall have a vapor barrier in accordance with ASTM E-1745.

H. If concrete, mixes should be placed with a water/cement ratio of .45.

I. If concrete, surface should have a medium-broom finish.

J. Curing compounds should not be used unless the curing compound manufacturer specifically states the surface may be coated with water based acrylic coatings.

1.4 ACTION SUBMITTALS

A. Manufacturer specifications for components, color chart and installation instructions.

B. Authorized Applicator certificate from the surface system manufacturer.

C. Reference list from the installer of at least 5 projects of similar scope done in each of the past 3 years.

D. Current Material Safety Data Sheets (MSDS).

E. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the Owner's satisfaction that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1000 hours illustrating the UV stability of the system.

1.5 MATERIAL HANDLING AND STORAGE

A. Store materials in accordance with manufacturer specifications and MSDS.

B. Deliver product to the site in original unopened containers with proper labels attached.

C. All surfacing materials shall be non-flammable.

1.6 GUARANTEE

A. Provide a guarantee against defects in the materials and workmanship for a period of one year from the date of substantial completion.

1.7 INSTALLER QUALIFICATIONS

A. Installer shall be regularly engaged in construction and surfacing of acrylic sport courts, play courts or similar decorative surfaces.

B. Installer shall be an Authorized Applicator of the specified surface system.

1.8 MANUFACTURER QUALIFICATIONS

A. System manufacturer shall be a US owned company.

B. System manufacturer shall be a member of the ASBA.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. DecoTurf, a division of ICP Construction, Inc., 150 Dascomb Road, Andover MA 01810; Phone: (800) 332-6178 Email: orders@cssurfaces.com Web: https://www.decoturf.com

B. Substitutions: Submit requests at least 7 days prior to the bid date with a complete type written list of proposed substitutions with sufficient data, drawings, samples and literature to demonstrate to the owners satisfaction that the proposed substitution is of equal quality and utility to the specified product. Information must include a QUV test of at least 1000 hours illustrating the UV stability of the system.

2.2 MATERIALS

A. Patching Mix (California Court Patch Binder) - for use in patching cracks, holes, depressions and other surface imperfections, as necessary.

B. Crack Filler (California Crack Filler) - for use in filling fine cracks, as necessary.

C. Concrete Preparer is a specially formulated acid heat for use in neutralizing the concrete in preparation for the DecoTurf System.

D. Acrylic Wearing Surface (Acrylotex/DecoColor MP) – for use as the finish color and texture. DecoColor MP and Acrylotex are blended at the job site to achieve the correct surface texture.

E. Line Paint (California Line Paint) – for use as the line marking on the court/play surface.

F. Water – for use in dilution/mixing shall be clean and potable.

2.3 MATERIAL SPECIFICATIONS

A. Court Patch Binder – 100% acrylic resin blended with Portland Cement and silica sand.
   1. Percent solids by weight (minimum) 46%
   2. Weight 8.7-8.9 lbs./gallon

B. California Crack Filler – 100% acrylic resin heavily filled with sand.
   1. Percent solids by weight (minimum) 85%
   2. Percent solids by weight (minimum) 15 lbs./gallon

C. Concrete Preparer – Phosphoric Acid based surface treatment
   1. Weight 9.5-9.6 lbs./gallon

D. DecoColor MP – 100% acrylic resin (no vinyl copolymerization constituent) with selected light fast pigments. Green shall contain not less than 10% chrome oxide.
   1. Percent solids by weight (minimum) 43.0%
   2. Weight 10.5./gallon

E. Acrylotex I Neutral – 100% acrylic resin to be blended with DecoColor MP and Portland Cement. Contains not more than 63% rounded silica sand.
   1. Percent solids by weight (minimum) 71%
   2. Weight 11.9 lbs./gallon

F. California Line Paint – 100% acrylic resin containing no alkyds or vinyl constituents. Texturing shall be rounded silica sand.
   1. Percent solids by weight (minimum) 60.5%

2. Weight 12-12.3 lbs./gallon

G. All surfacing materials shall be non-flammable and have a VOC content of not less than 100g./ltr. Measured by EPA method 24.

H. Local sands are not acceptable in the color playing surface. Sands must be incorporated at the manufacturing location to insure quality and stability.

PART 3 - EXECUTION

3.1 WEATHER LIMITATIONS

A. Do not install when rainfall in imminent or extremely high humidity prevents drying.

B. Do not apply unless surface and air temperature are 50°F and rising.

C. Do not apply if surface temperature is in excess of 140°F.

3.2 PREPARATION

A. Clean surfaces of loose dirt, oil, grease, leaves, and other debris in strict accordance with manufacturer's directions. Pressure washing will be necessary to adequately clean areas to be coated. Any areas previously showing algae growth shall be treated with Clorox or approved product to kill the organisms and then be properly rinsed.

B. Holes and cracks: Cracks and holes shall be cleaned and a suitable soil sterilant, as approved by the owner, shall be applied to kill all vegetation 14 days prior to use of Court Patch Binder according to manufacturer's specifications.

C. Depression: Depressions holding enough water to cover a five cent piece shall be filled with Court Patch Binder Patching Mix. 3 gallons of Court Patch Binder, 100 lbs. 60-80 silica sand, 1 gallon Dry Portland Cement (Type I). The contractor shall flood all the courts and then allow draining. Define and mark all areas holding enough water to cover a nickel. After defined areas are dry, prime with tack coat mixture of 2 parts water/l part Court Patch Binder. Allow tack coat to dry completely. Spread Court Patch Binder mix true to grade using a straight edge (never a squeegee) for strike off. Steel trowel or wood float the patch so that the texture matches the surrounding area. Never add water to mix. Light misting on surface and edges to feather in is allowed as needed to maintain work ability. Allow to dry thoroughly and cure.

D. No work from this stage on shall commence until an inspector has accepted the surface.

E. Acid Treatment (Concrete Surfaces ONLY): Concrete Preparer shall be applied to all uncoated concrete surfaces at the rate of .01 to .012 gallon per square yard. Dilute 1 gallon of Concrete Preparer with 4 gallons of potable water. Apply liberally to the surface and spread with a soft hair push broom. After the surface has dried remove any dust or latent material.

3.3 APPLICATION

A. All areas to be color coated shall be clean, free from sand, clay, grease, dust, salt or other foreign matters. The Contractor shall obtain the Engineer's approval, prior to applying any surface treatment.

B. Blend Acrylotex and DecoColor MP with a mechanical mixer to achieve a uniform mixture. The mix ratio shall be:
   1. Acrylotex 30 gallons
   2. DecoColor MP 10 gallons
   3. Water 15 gallons
   4. Portland Cement 1-2 gallons

C. One gallon equals approximately 22 pounds dry Portland cement. Additional Portland cement will provide further hardness and faster drying**.** Portland Cement is optional on asphalt, but it will improve wear resistance. White Portland Cement is preferred. The diluted material shall be homogeneous. Segregation before or during application will not be permitted. A mechanical drill mixer is recommended and mixture should be stirred until homogeneous. Periodic mixing should take place as job progresses to ensure consistent application.

D. Application shall be made by 50 durometer rubber faced squeegees. The mixture should be poured on to the court surface and spread to a uniform thickness in a regular pattern.

E. A total of 2 applications of textured Acrylotex/DecoColor MP mix shall be made to achieve a total application rate of not less than .10 gal./sy/coat. No application should be made until the previous application is thoroughly dry.

F. Multi-Sport play areas with concentrated wear areas such as basketball alleys may receive an extra coat of the Acrylotex mix to extend life expectancy.

3.4 LINE PAINTING

A. If intended for sports use, lines shall be carefully laid out in accordance with ASBA guidelines. The area to be marked shall be taped to insure a crisp line. The California Line Paint shall have a texture similar to the surrounding play surface. Application shall be made by brush or roller at the rate of 150-200 sf/gal.

3.5 PROTECTION

A. Erect temporary barriers to protect coatings during drying and curing.

B. Lock gates to prevent use until acceptance by the owner’s representative.

3.6 CLEAN UP

A. Remove all containers, surplus materials and debris. Dispose of materials in accordance with local, state and Federal regulations.

B. Leave site in a clean and orderly condition.

END OF SECTION 099300

SECTION 10 11 10
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Wall-mounted glassboards.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry.

B. Section 09 21 16 - Gypsum Board Assemblies.

1.04 REFERENCE STANDARDS

A. Porcelain Enamel Institute: PEI-1002 Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's data on markerboard, tackboard, and accessories.

B. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

C. Samples: Submit one sample 4 by 4 inch in size illustrating materials and finish, color and texture of chalkboard, markerboard, tackboard, tackboard surfacing, and trim.

D. Test Reports: Show conformance to specified surface burning characteristics requirements.

E. Manufacturer's printed installation instructions.

F. Maintenance Data: Include data on regular cleaning, stain removal.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

B. Regulatory Requirements: Conforms to applicable code for flame/smoke rating in tackboards in accordance with ASTM E84.

1.07 WARRANTY

A. Manufacturer Warranty: The manufacturer shall warrant the installation to be free of defects in material and workmanship for a period of one (1) year from Date of Substantial Completion.

B. Special Extended Warranty – Special Requirements: Manufacturer shall warrant the porcelain enamel steel markerboard writing surfaces are guaranteed for the life of the building, beginning from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Clarus: clarus.com; P: (877) 783-0104; E-mail: info@clarus.com.
   1. Substitutions: Not permitted.

2.02 WALL-MOUNTED GLASSBOARDS

A. HEALTHCARE GLASSBOARDS, designated in the Drawings as Finish Type MB-1.
   1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

2. Product: Clarus; Healthboard Float Transition, with removable high-resolution graphics.
    a. Glass: Clarus tempered safety glass, 1/4 inch thickness.
        1) Color: As selected from manufacturer's full range.
        2) Non-staining writing surface.
        3) Compatible with any marker, even permanent.
3. Application/s:
    a. Patient rooms.
4. Size/Orientation: As indicated on drawings.
5. Finish: Magnetic.
6. Mounting:
    a. Float: Concealed mounting hardware and anchors, secured to wood blocking concealed in wall construction.
7. Accessories (at each glassboard location):
    a. Magnetic Box Tray; Color: As selected from manufacturer's full range.
    b. Clarus Markers: Set of 4.
    c. Square Magnets (Set of 3); Color: As selected from manufacturer's full range.
    d. Magnetic Dry Eraser.

B. GLASS MARKERBOARDS, designated in the Drawings as Finish Type MB-2.
1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information
2. Product: Clarus; Float + Depth Glassboards
    a. 1/4 inch thickness, Clarus tempered safety glass.
    b. Non-staining writing surface.
    c. Compatible with any marker, even permanent.
3. Color: As selected from manufacturer's full range.
4. Size/Orientation: As indicated on drawings.
5. Finish: Magnetic.
6. Mounting:
    a. Depth: Stainless steel standoff hardware and anchors, secured to wood blocking concealed in wall construction.
7. Accessories (each glassboard location):
    a. Magnetic Box Tray; Color: As selected from manufacturer's full range.
    b. Clarus Markers: Set of 4.
    c. Square Magnets (Set of 3); Color: As selected from manufacturer's full range.
    d. Magnetic Dry Eraser.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that internal wall blocking is ready to receive work and that positioning dimensions are as indicated on shop drawings.

3.02 INSTALLATION

A. Install glassboards in accordance with manufacturer's instructions.

B. Prior to installation verify the height above the finished floor to the bottom of glassboards.

C. Secure units level and plumb.

3.03 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

END OF SECTION 10 11 10

SECTION 10 14 00
INTERIOR SIGNAGE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Cut Metal Letters and Logos

1.03 RELATED REQUIREMENTS

A. Section 09 21 16 - Gypsum Board Assemblies

1.04 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.05 SUBMITTALS

A. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

B. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

C. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

D. Manufacturer's Qualification Statement.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

B. Installer Qualifications: An employer of workers trained and approved by manufacturer.

C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

D. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

1.08 WARRANTY

A. The manufacturer shall warrant the product against material defects, or defects in manufacturing, for three (3) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: ASI Signage Innovation

B. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
   1. LTD Signs and Graphics (Kansas City, MO)
   2. ACE Sign Systems, Inc.

3. Advance Corporation: Braille-Tac Division.
4. A.R.K. Ramos.
5. Impact Architectural Signs
6. APCO Signs
7. Gemini

C. Products of unnamed manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
   1. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”.

2.02 INTERIOR ROOM SIGNAGE

A. Interior Room Signage:
   1. Basis of Design Product: InTouch™ ADA- Ready™ Sign System with requirements indicated for materials, thickness, finish colors, designs, shapes, sizes and details.

B. Materials:
   1. Face: InTouch™ Photopolymer Face, in matte (non-glare) finish.
   2. Backing Plate: Acrylic.

C. Fabrication:
   1. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1 , unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
   2. Tactile Graphics and Text:
      a. Fabrication process: Provide tactile copy and grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s photopolymer bonded process. Sign face of single material, tactile characters and Braille integral to photopolymer. Adhesive-fixed characters are not acceptable.
      b. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors. Tactile characters to be raised min. 1/32” from surface. Computerized translation of sign copy to be responsibility of the manufacturer.
   3. Installation Method: System VT, vinyl tape.

D. Sign Types:
   1. Room and Door Signs: Provide a sign for each doorway as scheduled on the drawings.
      a. Sign Type: Flat signs with applied character panel media as specified.
      b. Provide "tactile" signage, with letters raised minimum
      c. Sign Size: As indicated on the drawings.
      d. Corners: Radisued - 3/4".
      e. Thickness: 1/4".
      f. Character Height: As indicated on drawings.
      g. Sign Types:
         1) Room Signs (Sign Type A): Identify with room numbers to be determined later, not the numbers shown on the drawings.
         2) Service Rooms (Sign Type B): Identify with room names and numbers to be determined later, not those shown on the drawings, and braille.
         3) Rest Rooms (Sign Types C, D, and E): Identify with pictograms, the names "MEN", "WOMENS", "UNISEX TOILET", and braille.
         4) Locker Rooms (Sign Type F, G and H): Identify with pictograms, the names "MENS LOCKER ROOM", "WOMENS LOCKER ROOM", "UNISEX CHANGING ROOM", and braille.
         5) Exit Sign (Sign Type J): Identify with the name "EXIT", and braille.
         6) Occupant Load Sign (Sign Type K): Identify with the text "MAXIMUM OCCUPANCY", and the numbers of occupants.

7) Elevator Sign (Sign Type L): Identify with pictogram, text, ad braille as shown on the drawings.
8) Stairwell Sign (Sign Type M): Identify with pictogram, text, ad braille as shown on the drawings.

2. Applied Vinyl Lettering and/or graphics: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.
   a. Sign Types:
      1) Accessibility Symbol (Sign Type I): Identify with pictogram.
3. Color and Font:
   a. Character Font: Helvetica, Arial, or other sans serif font.
   b. Character Case: Upper case only.
   c. Background Color: As selected by Architect.
   d. Character Color: Contrasting color.

2.03 INTERIOR DIMENSIONAL LETTERS AND LOGOS

A. Cut Metal Letters and Logos, designated on the "Specialty Equipment Schedule" as Equipment Type U-XXXX.
   1. Product: ASI; Series LPS Cut Metal Dimensional Letters.
      a. Material: Aluminum - 5052 Alloy.

B. Type U1001: Logo Panel:
   1. Location:
   2. Owner Logo: Camera ready art of logo to be provided by Architect.
   3. Material: Aluminum in Baked Enamel finish.
   4. Color: To be selected by Architect from manufacturer's standard product line.
   5. Depth: 3/16-inch
   6. Mounting Method: 1/2-inch hidden point standoff.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install neatly, with horizontal edges level.

C. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

D. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

END OF SECTION 10 14 00

SECTION 10 14 13
EXTERIOR SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building identification signage:
   1. Dimensional letters.
   2. Lettering and logo at monument sign.

B. Traffic signs.

1.02 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.03 SUBMITTALS

A. Product Data: Submit product data for specified products. Include material details for each sign specified.

B. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.

C. Samples: Submit supplier’s standard color chart for selection purposes and selected colors for verification purposes.

D. Installation: Submit supplier’s installation instructions.

E. Closeout Submittals:
   1. Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods.
   2. Submit warranty documents specified herein.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with a minimum of three years of experience.

B. Installer Qualifications: Worker/s trained and approved by the manufacturer.

C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

D. Signage required to be accessible to people with disabilities must comply with requirements in ADA-ABA Accessibility Guidelines and with requirements of authorities having jurisdiction, whichever are more stringent. Verify local requirements and insert additional requirements below.

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 the intended use.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Handle products following the manufacturer's instructions.

D. Package signs as required to prevent damage before installation.

1.06 WARRANTY

A. Manufacturer Warranty: The manufacturer shall warrant the installation to be free of defects in material and workmanship for a period of three (3) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Products from ASI Signage Innovation are specified to establish a standard of quality for design, function, materials, and appearance.

B. Products of other manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
   1. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”.

2.02 FABRICATED METAL CHANNEL LETTERS, ILLUMINATED

A. Basis-of-Design Product: ASI; Series LF - Light Weight Fabricated Metal Dimensional Letters, Face-Lit.
   1. Materials:
      a. Acrylic Face with Trim Cap: Sign grade acrylic, 3/16-inch (0.20 inches) thick
         1) Sign grade acrylic, 3/16-inch (0.20 inches) thick
            (a) Color to be selected by Architect from manufacturer's standard colors.
         2) Trim Cap: 3/4-inches
      b. Aluminum returns and backs in baked enamel finish.
         1) Thicknesses:
            (a) Returns: 0.063 inches (1.6 mm)
            (b) Backs: 0.040 inches (1.02 mm)
      c. Finish: Baked enamel finish:
         1) High reflective white interior
         2) Exterior Color: To be selected by Architect from the manufacturer's standard colors.

B. Signage Type:
   1. Location:
   2. Lettering Height: As indicated on Drawings
   3. Letter Depth: 5-inches
   4. Letter Style: From manufacturer's standard letter chart.
      a. Text: INSERT TEXT (All caps)
   5. Lighting Package: Fabricated letters lit with 12-volt DC LEDs.

C. Mounting Method: Flush mounting, Concealed studs:
   1. Provide L-brackets with threaded stud boss secured with high-resistance epoxy to letter return. Stud boss to receive threaded mounting studs.
   2. Stud size and type shall be as required by the manufacturer for application and design intent.
   3. A mounting template designating stud locations shall be provided.

D. Fabrication:
   1. Cutting: Computer-guided lasers cut face and back letters.
   2. Letter returns are cut to size based on the letter depth, bent to the contour of the laser cut faces to produce a hollow-backed letter with 90º angle edges.
   3. Inside joints are MIG welded with 1”-1.5” intervals.

2.03 CUT METAL LETTERS AND LOGOS

A. Product: ASI, Series LPS Cut Metal Dimensional Letters.
   1. Material: Aluminum - 5052 Alloy.

2. Letter Height: As indicated on drawings.
3. Letter Depth: 1/4 inch
4. Font and Typeface:
    a. Character Font: TBD.
    b. Character Case: Upper and lower case (title case).
5. Finish: Aluminum in baked enamel finish
    a. Color: To be selected by Architect from manufacturer standard product line.
6. Mounting Method: Stud-mounted, 1/2-inch standoff.

B. Monument Sign at Site Entrance: 1 location, double-sided. Monument sign includes the following:
1. Facility Name: Allow for a total of 36 individual letters on each side, 8 inches high, metal.
2. Facility Address: Allow for a total of 5 individual numbers on each end of the monument sign, 4 inches high, metal.
3. Logo Panel:
    a. Provide logo panel on each side of the monument sign
    b. Camera-ready art of logo to be provided by Architect.
    c. Logo Panel Size: As indicated on drawings
    d. Panel Thickness: 1/4-inch
    e. Material: Aluminum in baked enamel finish.
        1) Color/s: To be selected by Architect from manufacturer's standard product line. Multiple colors will be used

C. Other Building Signage:
1. Main Entrance Sign Panel: Pre-finished aluminum sign panel containing visitor information, hours, after-hours entry, emergency information, etc.

2.04 MONUMENT SIGN

A. Acceptable Product: ASI Signage Innovations Legacy L500 Series, custom shape,1 sided, non-illuminated, removable face pylon, of aluminum face construction.
1. Removable Aluminum face sign cabinet:
    a. Construction: Provide 0.090” or .125” aluminum face bonded to a rigid 6061-T6 extruded aluminum framework to form a cabinet thickness of 24 inches. The sign shall have internal reinforcement to prevent surface deflection or oil-canning.
    b. Assembly: Aluminum sign face panel shall be attached flush to bleed frame or slid into slide frame extrusion, with no visible screws, fasteners.
    c. Sign Finish: Provide Matthews satin polyurethane coating, with a maximum gloss of 24 degrees. Faces shall be smooth, free of scratches, blemishes, or other imperfections.
    d. Color: As selected from the manufacturer's standard colors.
    e. Thickness: 24 inches. To accommodate the digital display.
    f. Mounting: Provide faces track into integral receiving channels on panel cabinet, which receive flush to the exposed cabinet.
    g. End Detail: Custom
    h. Framework construction: Provide mitered and welded aluminum extrusion, reinforced with aluminum plate.
    i. Mounting:
        1) Base Mounting: Provide a black structural angle that mechanically fastens to anchor bolts embedded in the concrete foundation.
        2) Direct Burial Mounting: Provide two structural aluminum extrusions, extension into sign cabinet as required to develop required wind load resistance. Extrusions directly embedded in the concrete foundation, depth as required to develop required wind load resistance. All exposed areas of extrusions finished matching base reveal.
            (a) Design, Shape, and Size: As indicated on Drawings.

(b) Color and Finish: As selected from the manufacturer’s standard colors and finishes.
(c) Wind load: Construct sign structure to withstand 100 mph wind load.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

A. Install products following supplier’s instructions.

B. Install products in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance.

C. Install products level, plumb, and at heights indicated.

D. Install signs within the following tolerances and in accordance with the manufacturer's recommendations:
   1. Exterior Signs: Within 1 inch vertically and horizontally of the intended location.

3.03 CLEANING, PROTECTION, AND REPAIR

A. Remove temporary coverings and protection to adjacent work areas. Clean installed products following manufacturer's instructions before Owner's acceptance.

END OF SECTION 10 14 13

SECTION 10 21 13.17
COMPACT LAMINATE (PHENOLIC) TOILET COMPARTMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Compact laminate (Phenolic) toilet compartments and screens.

B. Urinal screens.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

1.03 REFERENCE STANDARDS

A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Provide data on panel construction, hardware, and accessories.

C. Shop Drawings: Indicate partition plan, elevation views, dimensions, details of wall supports, door swings.

D. Samples: Submit two samples of partition panels, 6 by 6 inches in size illustrating panel finish, color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special procedures.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Toilet Compartments:
   1. Specified Manufacturer: Bobrick Washroom Equipment.
      a. Other Acceptable Manufacturers:
         1) All American Metal Corp - AAMCO: www.allamericanmetal.com/#sle.
         2) ASI Accurate Partitions: www.asi-accuratepartitions.com/#sle.
         3) ASI Global Partitions: www.asi-globalpartitions.com/#sle.
      b. Substitutions: 012500 01 25 00.

2.02 COMPACT LAMINATE MATERIAL

A. Material: Solidly fused plastic laminate with matte-finish melamine surfaces; integrally bonded colored face sheets and black phenolic-resin core.
   1. Product: Wilsonart® Compact Grade Laminate (CGL), no substitutions.
      a. Core Color: Black.
      b. Double Faced.
      c. Face Sheet/s Color: As scheduled in the Drawings.
      d. Texture: 60 Finish–A fine matte texture with a slight sheen (Standard).
      e. Interior Finish Classification (ASTM E84): Class B fire rating.
         1) Smoke Development: 165-250.
         2) Flame Spread: 55 - 60.
   2. Fire-Rated Grade Compact Laminate:
      a. Interior Finish Classification (ASTM E84): Class A fire rating.
         1) Smoke Development: 110 - 165.
         2) Flame Spread: 15.

2.03 COMPACT LAMINATE TOILET COMPARTMENTS & SCREENS

A. Basis of Design Product: Bobrick; DuraLine Series 1182, Compact Laminate (Solid Phenolic) Toilet Partitions, or equivalent.

B. Factory-fabricated doors, pilasters, divider panels, floor-mounted headrail-braced.
   1. Color: As scheduled in the Drawings.

C. Door Panels:
   1. Thickness: 3/4 inch.
   2. Width: 24 inches.
   3. Width for Handicapped Use: 36 inches, out-swinging.
   4. Height: 58 inches.
   5. Floor Clearance: 12 inches.

D. Panels and Screens:
   1. Thickness: 1/2 inch.
   2. Height: 48 inches.
   3. Depth: As indicated on drawings.
   4. Floor Clearance: 12 inches.

E. Pilasters (Stiles):
   1. Thickness: 3/4 inch.
   2. Width: As required to fit space; minimum 3 inch.
   3. Height: 69 inches.

F. Screens: Without doors; to match compartments; mounted to wall with two panel brackets with vertical support/bracing same as compartments.

2.04 ACCESSORIES

A. Pilaster Shoes: Formed ASTM A666 Type 304 stainless steel with No. 4 finish, 4 inches high, concealing floor fastenings.
   1. Leveling Devices: Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster.

B. Head Rails: Hollow anodized aluminum, 1 inch by 1-1/2 inch size, with anti-grip profile and cast socket wall brackets.

C. Wall and Pilaster Brackets: Polished stainless steel; continuous type.

D. Attachments, Screws, and Bolts: Stainless steel , tamper-proof type.
   1. For attaching panels and pilasters to brackets: Through-bolts and nuts ; tamper proof.

E. Hardware: Polished stainless steel:
   1. Pivot hinges, gravity type, adjustable for door close positioning; two per door.
   2. Door Latch: Slide type with exterior emergency access feature.
   3. Door strike and keeper with rubber bumper; mounted on pilaster in alignment with door latch.
   4. Coat hook with rubber bumper; one per compartment, mounted on door.
   5. Provide door pull for outswinging doors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attach panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

3.03 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

END OF SECTION 10 21 13.17

SECTION 10 21 23
CUBICLES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Cubicle curtains with a surface-mounted overhead tracking system.

B. Shower curtains, rods, and rings.

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 09 21 16 - Gypsum Board Assemblies

Section 09 51 00 - Acoustical Ceilings

1.04 REFERENCES

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

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

1.05 SUBMITTALS

A. Submit in conformance with the provisions of Section 01 33 00.

B. Product Data: Provide data for curtain fabric, track and hardware.

C. Shop Drawings: Indicate a reflected ceiling plan view of curtain track, hangers, and suspension points, attachment details, schedule of the curtain sizes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Environmental Limitations: Do not install cubicles until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where cubicles are indicated to fit 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.

1.07 WARRANTY

A. Provide a copy of the manufacturer’s standard warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Owner Standard: The products specified in this Section are restricted to the specified manufacturers. Product substitutions are not permitted.
   1. Cubicle Curtain:
      a. Specified Manufacturer: Mayer
      b. Contractor Furnished / Contractor Installed (CFCI)
   2. Cubicle Curtain Tracking System and Components:
      a. Specified Manufacturer: InPro Corporation.
      b. Contractor Furnished / Contractor Installed
   3. Shower Curtain:
      a. Specified Manufacturer: InPro.
      b. Contractor Furnished / Contractor Installed

4. Shower Curtain Rods and Rings:
    a. Specified Manufacturer: InPro Corporation.
    b. Contractor Furnished / Contractor Installed

2.02 CUBICLE CURTAIN TRACKING SYSTEM

A. Contractor Furnished / Contractor Installed (CFCI)

B. Product: C/S; Model #6062N surface-mounted track/s of heavy extruded aluminum alloy 6063-T4, 1 3/8" x 3/4", slotted to receive roller carriers, complete with accessories and components required for complete and secure installations including splices, end caps and corner bends.
    1. Profile: Channel.
    2. Mounting: Surface.
    3. Structural Performance: Capable of supporting vertical test load of 50 lbs without visible deflection of track or damage to supports, safely supporting moving loads, and sufficiently rigid to resist visible deflection and without permanent set.
    4. Track End Stop: To fit the track section.
    5. Track Bends: Minimum 12 inch radius; fabricated without deformation of track section or impeding movement of carriers.
    6. Finish on Exposed Surfaces: Clear anodized.
    7. Carriers: Model #1062N, virgin nylon axle with nylon wheels complete with nickel-plated brass bead chain and hook assembly.
        a. Provide one carrier for each 6" of cubicle curtain width.
    8. Wand: Plastic hollow section, attached to lead carrier, for pull-to-close action.
    9. Installation Accessories: Types required for specified mounting method and substrate conditions.
    10. Mounting:
        a. Track shall be ceiling surface-mounted with #8 pan head screws or with toggle or molly bolts spaced no more than 30" apart.
    11. Coordination: Comply with NFPA 13 requirements and coordinate installation of sprinkler heads with the cubicle curtain track.

2.03 CUBICLE CURTAIN/S

A. Contractor Furnished / Contractor Installed (CFCI)

B. Cubicle Curtains, designated in the Drawings as Finish Type CC- #
    1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

C. Type CC-1:
    1. Manufacturer: As scheduled .
    2. Product: As scheduled.
    3. Color: As scheduled.

D. Physical Properties:
    1. Content: 58% Polyester, 42% Post Consumer Recycled FR Polyester.
    2. Lightfastness: 60 Hours.
    3. Open Mesh Cloth: Open weave to permit air circulation; flameproof material, manufacturer's standard color.
        a. Attachment of Curtain Fabric to Open Mesh Cloth: Manufacturer's standard sewn seam.
    4. Fire Performance:
        a. Surface Burning Characteristics (ASTM E84): Flame spread index of 25, maximum; smoke-developed index of 450, maximum; when tested in accordance with ASTM E84.
        b. Inherently flame-resistant or flameproofed; capable of passing NFPA 701 test.

E. Fabrication:

1. Curtain Width: Equal to track length from which curtain is hung plus 10 percent, but not less than 12-inches (300 mm).
2. Curtain Length: Equal to floor-to-ceiling height minus 2" from the finished ceiling at the top and 15-inches above the finished floor at the bottom.
3. Mesh Top: Include open mesh cloth at top 20 inches of the curtain for room air circulation, attached to curtain as specified above.
4. Curtain Heading: Fabric band matching curtain panel with metal grommet holes for carriers spaced 6 inches on center.
5. Seams and Hems:
    a. Top Hem: Not less than 1 inch (25.4 mm) and not more than 1-1/2 inches (38 mm) wide, triple thickness, reinforced with integral web, and double lockstitched.
    b. Bottom Hem: Not less than 1 inch (25.4 mm) and not more than 1-1/2 inches (38 mm) wide, double-thickness, and double lock-stitched. Lead weights included.
    c. Side Hems: Not less than 1/2 inch (13 mm) and not more than 1-1/4 inches (32 mm) wide, with triple-turned edges, and single lock-stitched.
    d. Vertical Seams: Not less than 1/2 inch (13 mm) wide, double turned, and double stitched.

2.04 SHOWER CURTAINS

A. Contractor Furnished / Contractor Installed (CFCI)

B. Shower Curtain, designated in the Drawings as Finish Type SC- #
    1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other information

C. Type SC-1:
    1. Product: Inpro; Clickeze ® Privacy Curtain
        a. Materials:
            1) Fabric: Provide 100% polyester curtains. Fabric is to be opaque, washable, flame retardant, and closely woven.
            2) Shield Fabric: Provide 100% polyester, impregnated and multi-coated with Aqueous based microporous polymers.
        b. Pattern and Color: As scheduled in the Drawings.
        c. Curtain Fabrication:
            1) Curtain Width: Manufacture curtains of one piece, sized to 10% wider than the shower rod length but no less than 12-inches extra fullness. Width tolerance ±3-inches.
            2) Curtain Height: 80 inches. The shower curtain hangs 1/2-inch above the floor. Height tolerance ±1/2-inch.
            3) Curtain Heading: Include 4-ounce (113.4g) nickel-plated grommets, 6-inches on center for carriers. Top hem to be triple-turned hem over nylon tape for rugged wear.
            4) Seams: Curtains are to be seamless when possible with sanitary “no scum" side and bottom edges. Sewing thread to be triple-ply twisted nylon.

2.05 SHOWER CURTAIN RODS AND RINGS

A. Contractor Furnished / Contractor Installed (CFCI)

B. Shower Curtain Rods and Rings, designated in the Drawings as Finish Type SCR- #
    1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other information

C. Type SCR-1:
    1. Product: InPro; Model #CE10075X:
        a. Length: As shown on drawings.
        b. Rod Construction: Type 304 Stainless Steel Tube, 1” (25.4mm) diameter x .035” (.89mm) wall thickness (20 gauge). Finish – BS, Bright Stainless.

c. Flange Construction: .031” (.89mm) thick, type 304 stainless steel. Includes two 3/16” (4.8mm) diameter mounting holes with formed countersink for #10 Oval Head Screws(by others).
d. Accessories:
    1) Rings: InPro; Model #CE100800 Stainless Steel Slide Beads
        (a) Height: 2-1/2 inches.
        (b) Inside Diameter: 1-5/16 inches.
        (c) Quantity: Coordinate with Owner provided shower curtains

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and supports above the ceiling are ready to receive work of this Section.

3.02 INSTALLATION

A. Cubicle Curtain Track:
    1. Install curtain track to be secure, rigid, and true to ceiling line.
    2. Suspend track from ceiling system.
    3. Install end cap and stop device.
    4. Install curtains on carriers ensuring smooth operation.

B. Shower Curtains and Accessories:
    1. Install shower curtains, rods, and hooks per manufacturer recommendations.

END OF SECTION 10 21 23

SECTION 10 22 39.13
FOLDING GLASS-PANEL PARTITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior aluminum-framed folding glass-panel partitions, horizontal opening.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2020.

B. AAMA 1801 - Voluntary Specification for the Acoustical Rating of Exterior Windows, Doors, Skylights and Glazed Wall Sections; 2021.

C. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

D. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

E. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2022.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2019.

I. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009 (Reapproved 2016).

J. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2014 (Reapproved 2021).

K. ASTM E413 - Classification for Rating Sound Insulation; 2022.

L. ASTM E557 - Standard Guide for Architectural Design and Installation Practices for Sound Isolation Between Spaces Separated by Operable Partitions; 2012 (Reapproved 2026).

M. ASTM E1425 - Standard Practice for Determining the Acoustical Performance of Windows, Doors, Skylight, and Glazed Wall Systems; 2014 (Reapproved 2023).

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene at project site seven calendar days prior to scheduled beginning of construction activities of this section to review section requirements.
   1. Require attendance by representatives of installer.
   2. Notify Architect four calendar days in advance of scheduled meeting date.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Provide data on partition materials, operation, hardware and accessories, electric operating components, and colors and finishes available.

C. Shop Drawings: Indicate layout, dimensions, identification of components, and interface with adjacent construction.
   1. Include field measurements of openings.

2. Include elevations showing:
    a. Locations and identification of manufacturer-supplied door hardware and fittings.
    b. Locations and sizes of cut-outs and drilled holes for other door hardware.
3. Include details of:
    a. Requirements for support and bracing of overhead track.
    b. Installation details.
    c. Appearance of manufacturer-supplied door hardware and fittings.

D. Verification Samples: Two samples, minimum size 2 by 3 inches, representing actual material and finish of exposed metal and glass.

1.06 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of Professional Engineer experienced in design of this type of work and licensed in Missouri.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until installation.

1.08 WARRANTY

A. Manufacturer Warranty: Provide two-year manufacturer warranty for _____. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 INTERIOR FOLDING GLASS-PANEL PARTITIONS - HORIZONTAL OPENING

A. Basis of Design: NanaWall Systems, Inc; SL45 Monumental Aluminum-Framed Folding/Paired Glass-Panel System: www.nanawall.com/#sle.
1. Folding Glass-Panel Partitions: Top hung, factory fabricated assemblies consisting of full-width aluminum-framed glass panels; complete with support and anchorage devices.
    a. Design to withstand normal operation without damage, racking, sagging, or deflection.
2. Performance Criteria:
    a. Acoustical Performance: Provide folding glass-panel partition assemblies tested by qualified testing agency in accordance with ASTM E90, ASTM E1425, or AAMA 1801.
        1) Sound Transmission Class (STC) Rating: STC of 36, minimum, calculated in accordance with ASTM E413.
    b. Structural Performance: No glazing material breakage or permanent damage to fasteners, anchors, hardware, or actuating mechanisms, when tested in accordance with ASTM E330/E330M.
        1) Installed partition system track capable of supporting imposed loads, with maximum deflection of 1/360 of span.
3. Configuration: Fold flat against wall opening; straight; paired panels; Stacking per plans, with locking swing panel door.
4. Glazed Aluminum-Framed Panel Construction:
    a. Aluminum Frames: Factory finished; manufacturer's standard corner construction; nonthermally broken.
        1) Panels: Single lite.
        2) Panel Rail Depth: 1-3/4 inches.
        3) Top Rail and Stile Width: 2-1/8 inches.
        4) Bottom Rail Width: 2-1/8 inches.

b. Aluminum Frame Finish: PVDF coating in accordance with AAMA 2605.
   1) Sheen: Matte.
c. Laminated Glass Thickness: 1/4 inch.
d. Maximum Support Capacity: Manufacturers standard load with two carriers on each panel.
e. Glass: Clear.
f. Panel hardware finish to match frame.

5. Sliding-Folding Hardware: Manufacturer's standard combination sliding and folding hardware with top and bottom tracks.
6. Overhead Track: Extruded aluminum box track, factory fabricated; corner, intersection, and hanger access fittings to suit partition movement and stacking indicated; track joints reinforced with stainless steel junction plates.
   a. Track Suspension System: Provide brackets, hanger rods, and hardware for attachment to structure, with at least 6-inch vertical adjustment range and capable of adjustments without removing panels from tracks.
7. Sill Type: ADA-compliant flush sill, with sealant, shims and fasteners at necessary locations.
   a. Finish: To match the panel frame.
   b. ADA Compliance at Swing Panel: Provide gasket to cover sill channel.
8. Operable Panel Hardware:
   a. Concealed edge-operated interlocking floor bolts.
   b. Lever handle, profile cylinder.
9. Panel Hinges:
   a. Stainless steel hinges and security hinge pins with set-screws.
10. Convertible Door Panel Fittings and Hardware:
    a. Top and bottom pivots concealed in full width top and bottom rails.
11. Acoustic Seals: Provide acoustic seals in accordance with project requirements.

2.03 MATERIALS

A. Glazing:
   1. Laminated Glass: Fully tempered float glass laminated in accordance with ASTM C1172, with eased and polished edges.
      a. Clear Plastic Interlayer: 0.060 inch thick, minimum.

B. Aluminum Components: Complying with ASTM B221 (ASTM B221M), alloy 6063, temper as indicated, with anodized finish complying with AAMA 611, and powder coating complying with AAMA 2603 or AAMA 2604 for select colors.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify track supports are laterally braced and will permit track to be level within 1/4 inch of required position and parallel to the floor surface.

C. Verify floor flatness of 1/8 inch in 10 feet, non-cumulative.

D. Do not begin installation until supports and adjacent substrates have been properly prepared.

E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean substrates thoroughly prior to installation.

B. Prepare substrates using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install partition in accordance with manufacturer's instructions and ASTM E557.

B. Fit and align partition assembly and pocket doors level and plumb.

3.04 TOLERANCES

A. Maintain dimensional tolerances and alignment with adjacent work.

B. Maximum Variation from Plumb: 1/16 inch.

C. Maximum Variation from Level: 1/16 inch.

D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 feet straight edge.

3.05 ADJUSTING

A. Adjust partition assembly to provide smooth operation from stacked to full open position. Do not over-compress acoustic seals.

3.06 CLEANING

A. Thoroughly clean surfaces and materials installed as part of this work.

3.07 PROTECTION

A. Protect installed products and materials until Date of Substantial Completion.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 10 22 39.13

SECTION 10 26 00
WALL AND DOOR PROTECTION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

B. Protective wall covering.

C. Door hardware protection.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

1.03 REFERENCE STANDARDS

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

1.04 SUBMITTALS

A. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.

B. Shop Drawings: Include plans, elevation, sections, and attachment details. Show design and spacing of supports for protective corridor handrails, required to withstand structural loads.

C. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.

D. Specimen Warranty.

E. Maintenance Data: For each type of product. Include information regarding recommended and potentially harmful cleaning materials and methods.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Store products in either horizontal or vertical position, in conformance with manufacturer's instructions.

1.06 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship for five (5) years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Corner Guards:
   1. Specified Manufacturer: Inpro: www.inprocorp.com/#sle.
      a. Other approved manufacturers::
         1) Babcock-Davis: www.babcockdavis.com/#sle.
         2) Construction Specialties, Inc: www.c-sgroup.com/#sle.
         3) Koroseal Interior Products: www.koroseal.com/#sle.
         4) Nystrom, Inc: www.nystrom.com/#sle.

2.02 PERFORMANCE CRITERIA

A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for conformance to applicable provisions of ASTM F476.

B. Chemical and Stain Resistance: Unless otherwise noted, provide protection products and assemblies with chemical and stain resistance conforming to applicable provisions of ASTM D543.

C. Fungal Resistance: Unless otherwise noted, provide protection products and assemblies which pass ASTM G21 testing.

2.03 WALL PROTECTION COMPONENTS

A. Wall Protection Components, designated on the Drawings as Finish Type WP- #
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

2.04 SURFACE-MOUNTED CORNER GUARDS

A. Corner Guards, designated on the Drawings as Finish Type CG- # .
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

2.05 PROTECTIVE WALL PANELS

A. Protective Wall Panels, designated on the Drawings as Type WP- # .
   1. Refer to the "Interior Finish Legend" for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

B. Door Hardware Protection: Position door hardware protection devices to align with door knob or door lever.

C. Corner Guards: Position corner guard 4 inches above finished floor to align with top of wall base, unless indicated otherwise.

D. Wall Panels: Position protective wall covering no less than 1 inch above finished floor to allow for floor-level variation.
   1. Full-Height Installation (when applicable: Establish a plumb line located at edge of starting point of first sheet to ensure following sheets will be installed plumb.
   2. Wainscot Installation (when applicable): Establish a level line at the specified height for entire length of run. Install by aligning top of edge of covering with this line.
   3. Installation:
      a. Apply adhesive with 1/8 inch V-notch trowel to an area of wall surface that can be completed within cure time of the adhesive.
      b. Install trim pieces as required for a complete installation. Allow tolerance for thermal movement.
      c. Use a roller to ensure maximum contact with adhesive.
      d. At inside and outside corners cut covering sheets to facilitate installation of trim pieces or corner guards.

3.02 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

3.03 CLEANING

A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION 10 26 00

SECTION 10 28 00
WASHROOM ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Commercial toilet accessories.

B. Commercial shower and bath accessories.

C. Healthcare accessories.

D. Diaper changing stations.

E. Utility room accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

1.03 WORK BY OWNER

A. Owner Furnished / Owner Installed (OFOI) Work:
   1. Washroom Accessories indicated in the Contract Documents as “OFOI” will be furnished and installed by Owner.

B. Owner Furnished / Contractor Installed (OFCI) Work:
   1. Washroom Accessories indicated in the Contract Documents as “OFCI” will be furnished by Owner for final installation by Contractor.
   2. Refer to Section 01 10 00 - Summary, for additional requirements.

1.04 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 2015a (Reapproved 2019).

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

D. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

E. ASTM B86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings; 2018, with Editorial Revision (2021).

F. ASTM B456 - Standard Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium; 2017 (Reapproved 2022).

G. ASTM C1036 - Standard Specification for Flat Glass; 2021.

H. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2018.

I. ASTM F2285 - Standard Consumer Safety Performance Specification for Diaper Changing Tables for Commercial Use; 2004, with Editorial Revision (2016).

1.05 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

1.06 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Manufacturer for each product specified, including:
   1. Manufacturer for each product specified, including:
      a. AJW Architectural Products: www.ajw.com/#sle.
      b. American Specialties, Inc: www.americanspecialties.com/#sle.
      c. Bobrick: www.bradleycorp.com/#sle.
      d. Bradley Corporation: www.bradleycorp.com/#sle.
      e. Georgia-Pacific Professional: www.gppro.com/#sle.
      f. Kimberly-Clark Corporation: www.kcprofessional.com/#sle.
      g. Whitehall Manufacturing: www.whitehallmfg.com/#sle.

B. Diaper Changing Stations:
   1. American Specialties, Inc: www.americanspecialties.com/#sle.
   2. Bradley Corporation: www.bradleycorp.com/#sle.
      a. Basis of Design: Callouts used.
   3. Diaper Deck & Company: www.diaperdeck.com/#sle.
   4. Koala Kare Products: www.koalabear.com/#sle.

C. Provide products of each category type by single manufacturer.

2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.

B. Keys: Provide (3) keys for each accessory to Owner; master key lockable accessories.

C. Stainless Steel Sheet: ASTM A666/A666M, Type 304.

D. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

F. Zinc Alloy: Die cast, ASTM B86.

G. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

H. Adhesive: Two component epoxy type, waterproof.

I. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.03 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, polished finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

E. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

F. Back paint components where contact is made with building finishes to prevent electrolysis.

2.04 ACCESSORY SCHEDULE

A. Washroom Accessories, designated on the "FFE Schedule" in the Drawings as Accessory Type A-xxxx and L-xxxx

2.05 COMMERCIAL TOILET ACCESSORIES

A. Accessory Type A5200 TOILET PAPER DISPENSER: Double roll, surface mounted.
   1. Scope: Contractor Furnished/ Contractor Installed (CFCI)
   2. Basis of Design: Bobrick; Model B-2888
      a. Substitutions: Section 01 60 00 - Product Requirements.
   3. Mounting Height: 22 inches above the finished floor to top of the unit.
   4. Location: Located 7- to 9-inches from the front face of the water closet to the center of the first roll of toilet paper.

B. Accessory Type A5082: PAPER TOWEL DISPENSER
   1. Scope: Owner Furnished/ Contractor Installed (OFCI)
   2. Product: Owner is to provide product data to Contractor for installation labor pricing.
   3. Mounting Height: 54 inches above the finished floor to top of the unit.

C. Accessory Type A5075: SOAP DISPENSER
   1. Scope: Owner Furnished/ Contractor Installed (OFCI)
   2. Product: Owner is to provide product data to Contractor for installation labor pricing.
   3. Mounting Height:
      a. Above Base Cabinets: 42 inches a.f.f. to bottom of the unit.
      b. Lavatory Locations: 50 inches a.f.f., top of the unit.

D. Accessory Type A5076: SANITATION STATION
   1. Scope: Owner Furnished/ Owner Installed (OFOI)

E. Accessory Type A1066a & A1066b: MIRRORS: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
   1. Annealed Float Glass: 1/4 inch; silvering, protective, and physical characteristics in compliance with ASTM C1503.
   2. Size: 16 inches wide by 36 inches tall, unless otherwise indicated.
   3. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; satin finish.
   4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
   5. Installation: Mounting Height:
      a. Mirrors above lavatories: 40 inches (maximum) above the finished floor to the bottom edge of the reflecting surface.
      b. Large Format Mirrors: 18 inches a.f.f. to the bottom of the mirror.
   6. Mirror Locations: Where indicated in the drawings.
   7. Products: Refer to Heading 2.01, this Section.

F. Accessory Type A1082: MOBILE MIRROR
   1. Scope: Owner Furnished/ Owner Installed (OFOI)

G. Accessory Type A5109 GRAB BARS: Stainless steel, smooth surface.
   1. Standard Duty Grab Bars:
      a. Basis of Design (Standard): Bobrick; Model B-6806 Series Grab Bar, unless indicated otherwise.
      b. Push/Pull Point Load: minimum 250 pound-force
      c. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
      d. Finish: Satin.
      e. Type, Description, Length, and Configuration:
         1) Type A5109a: REAR WALL GRAB BAR: 36 inches, Horizontal

(a) Mounting Height: 36 inches a.f.f. to top of the grab bar.
(b) Location: 12 inches from the center of the water closet on one side and 24 inches on the other side.

2) Type A5109b: SIDEWALL GRAB BARr: 42 inches, Horizontal
(a) Mounting Height: 36 inches a.f.f. to top of the grab bar.
(b) Location: 12 inches from the rear wall to the flange centerline.

3) Type A5109c: SIDEWALL GRAB BAR: 18 inches, Vertical
(a) Mounting Height: 40 inches a.f.f. to the centerline of the bottom flange.
(b) Location: 40 inches from the rear wall to the centerline of the unit.

4) Type A5109d: FLIP-DOWN GRAB BAR: 29 inches (when down)
(a) Mounting Height: 36 inches a.f.f. to the centerline of the bottom flange.

H. Accessory Type A5090: SANITARY NAPKIN DISPOSAL UNIT: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.
1. Scope: Contractor Furnished/ Contractor Installed (CFCI)
2. Basis of Design: Bobick; Model B-27.
a. Substitutions: Section 01 60 00 - Product Requirements.
3. Mounting Height: 30 inches a.f.f. to the top of the unit.
4. Location: Align the side of the unit with the front edge of the toilet or water closet.

2.06 COMMERCIAL SHOWER AND BATH ACCESSORIES

A. Accessory Type A5145: HOOK, GARMENT, DOUBLE: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.
1. Basis of Design: Bobrick; Model B-233 Series Clothes Hook:
a. Substitutions: Section 01 60 00 - Product Requirements.

2.07 HEALTHCARE ACCESSORIES

A. PPE Dispensers
1. Accessory Type A5079: SANITARY WIPE DISPENSER:
a. Scope: Owner Furnished/ Contractor Installed (OFCI)
b. Product: Owner is to provide product data to Contractor for installation labor pricing.
2. Accessory Type A5107: GLOVE BOX DISPENSER:
a. Scope: Owner Furnished/ Contractor Installed (OFCI)
b. Product: Owner is to provide product data to Contractor for installation labor pricing.
c. Capacity: Three glove boxes.
3. Accessory Type A5108: SHARPS CONTAINER
a. Scope: Owner Furnished/ Contractor Installed (OFCI)
b. Product: Owner is to provide product data to Contractor for installation labor pricing.
4. Accessory Type A5077: HAND SANITIZER DISPENSER: Steel construction.
a. Scope: Owner Furnished/ Contractor Installed (OFCI)
b. Product: Owner is to provide product data to Contractor for installation labor pricing.
5. Accessory Type L1200: SPECIMEN PASS-THRU CABINET
a. Scope: Contractor Furnished/ Contractor Installed (CFCI)
b. Basis of Design: Bradley; Model 9813 Specimen pass-through cabinet.
c. Mounting Height: 42 inches above finished floor to the top of the interior shelf.

2.08 DIAPER CHANGING STATIONS

A. General:
1. Changing Stations shall comply with ADA and ICC A117.1 Accessibility Standards, and ASTM F2285, Standard Consumer Safety Performance Specification for Diaper Changing Stations for Commercial Use.
2. Mounting Height: 34-inches above the finished floor to top of the table, in an open position.

B. Accessory Type A4995: DIAPER CHANGING STATIONS: Wall-mounted folding diaper changing station for use in commercial toilet facilities, meeting or exceeding ASTM F2285.
   1. Front Panel Material: Stainless steel.
   2. Bed Surface: Grey color injection molded polypropylene with Microban antimicrobial additive, and ISO 22196 tested for efficacy. Surface is contoured, concave and smooth.
   3. Mounting: Surface.
   4. Minimum Rated Load: 250 pounds.
   5. Products:
      a. Substitutions: Not permitted.

2.09 UTILITY ROOM ACCESSORIES

A. Accessory Type A5109: UTILITY SHELF WITH MOP/BROOM HOLDERS: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
   1. Hooks: Four, 0.06 inch stainless steel rag hooks at shelf front.
   2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
   3. Length: Manufacturer's standard length for number of holders/hooks.
   4. Basis of Design: Bobick; Model B-239

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

3.02 PREPARATION

A. Provide templates and rough-in measurements as required.

3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

3.04 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION 10 28 00

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

1.02 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems; 2013a (Reapproved 2017).

B. NFPA 10 - Standard for Portable Fire Extinguishers; 2022.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Extinguishers:
   1. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: www.activarcpg.com/#sle.

B. Fire Extinguisher Cabinets and Accessories:
   1. Activar Construction Products Group, Inc. - JL Industries; Ambassador Series: www.activarcpg.com/#sle.
   2. Larsen's Manufacturing Co; _____: www.larsensmfg.com/#sle.

2.02 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
   1. Class: A:B:C type.
   2. Size: 10 pound.
   3. Temperature range: Minus 40 degrees F to ___ degrees F.

2.03 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated.
   1. Formed primed steel sheet; 0.036 inch thick base metal.

C. Fire Rated Cabinet Construction: One-hour fire rated.
   1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.

D. Cabinet Configuration: Semi-recessed type.
   1. Trim: Flat rolled edge, with ____ inch wide face.
   2. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

E. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with roller type catch. Hinge doors for 180 degree opening with continuous piano hinge.

F. Door Glazing: Tempered glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.

G. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

END OF SECTION 10 44 00

SECTION 10 56 17
WALL MOUNTED STANDARDS AND SHELVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shelf standards, brackets, and accessories

B. Laminate faced shelves

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. Submit under the provisions of Section 013300

B. Product Data: Manufacturer's data sheets on each product to be used.

C. Selection Samples: For each finished product specified, two complete sets of color chips representing the manufacturer's full range of available colors and patterns.

1.05 EXTRA MATERIALS

A. Deliver extra materials for the Owner's use in maintenance. Label and store as directed by the Owner including codes used on the Drawings. Do not deliver to the Project site until the Owner is prepared to receive and store maintenance materials.
   1. Extra Shelf Brackets: Ten of each size.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

1.07 WARRANTY

A. Provide manufacturer's Limited Lifetime Warranty covering defects in materials and workmanship occurring during normal use.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Knape & Vogt Manufacturing Company
   1. Products of other manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
      a. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”.

2.02 COMPONENTS

A. Steel Shelf Standards, Brackets, and Accessories:
   1. Extra-Duty Shelf Standards and Brackets: Double-slotted channel standards for brackets adjustable in 1 inch increments along the entire length of standard, drilled, and countersunk for screws.
      a. General:
         1) Load Rating: BHMA Grade 2 Compliant
         2) Load Capacity: Up to 680 lbs per pair of standards.
      b. Standards: KV 85-ANO-XX, Double-Slot Wall Standard
         1) Material: 16-gauge steel
         2) Dimensions: 1-1/4 inches wide x 1/2-inch deep
         3) Length/s: As indicated on drawings

4) Finish: Anachrome

c. Brackets: KV 185-ANO-XX, Double-Flange Adjustable Brackets
   1) Type: Double tab type, locking into slots; size to suit shelves; same finish as standards
   2) Vertically adjustable in 1-inch increments
   3) Material: 16-gauge steel (8- to 12-inch brackets); 14-gauge (14- to 24-inch brackets)
   4) Shelf / Bracket Depth: As indicated on drawings
   5) Quantity: Provide one bracket for every 12 inches of standard length.

d. Shelf Rests: KV 106-ANO, for joining two shelves at one bracket

2.03 UTILITY SHELVING

A. Laminate Faced Shelves:
   1. Particleboard or medium-density fiberboard, 1-inch thickness
   2. Laminate: Thermally Fused Melamine Laminate (TFM)
      a. Color: White
   3. Edge Finish: 3-mm PVC edgebanding, all edges
   4. Length: 36 inches maximum
   5. Shelf Quantity: Provide one shelf for every 12 inches of length of standard, per pair of standards, unless otherwise indicated.

B. Fasteners: Screws as recommended by the manufacturer for the intended application or as otherwise required by project conditions. Finish of exposed to view fasteners to match the finish of standards and other components.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify the Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly before installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install following the manufacturer's instructions.

B. Mount standards to concealed wood blocking inside of the walls capable of supporting intended loads.

C. Install brackets, shelving, and accessories.

END OF SECTION 10 56 17

SECTION 10 73 16.13
METAL CANOPIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Attached metal canopies.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures; Most Recent Edition Cited by Referring Code or Reference Standard.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Submit product data sheets, including material descriptions and finishes, and preparation instructions and recommendations.

C. Shop Drawings: Prior to commencement of fabrication, submit detailed shop drawings, showing profiles, sections of components, finishes, and fastening details.

D. Design Data: Submit comprehensive structural analysis of design for the specified loads. Stamp and sign calculations by professional engineer.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Perform design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Missouri.

B. Manufacturer Qualifications: Company specializing in the manufacture of products similar to those required for this project.
   1. Not less than three years of documented experience.

1.06 WARRANTY

A. See Section 013300 for additional warranty requirements.

B. Metal Canopies: Correct defective work within a two year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Canopies:
   Mapes Canopies; Cantilever Bracket Support: www.mapescanopies.com.
   1. Substitutions: See section 006325.

2.02 METAL CANOPIES

A. Shop Fabricated Steel Canopy

B. Configuration: Layout and dimensions, column layout, canopy clearance, fascia profile, and roof covering design as indicated on drawings.
   1. Installation: Face-mounted to building structure.
   2. Drainage Concept: Water collected in decking conducted into perimeter gutters and discharged through downspouts.

C. Performance Requirements:
   1. Design and fabricate metal canopy system to resist wind, snow, live, and seismic loads without failure, damage, or permanent deflection in accordance with ASCE 7:
      a. Loads: As indicated on drawings.

2.03 FINISHES

A. Structural Steel Framing:

1. Shop Primer: Rust-inhibitive red oxide.

PART 3 EXECUTION

3.01 INSTALLATION - FRAMING

A. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation.

B. Set column base plates with non-shrink grout to achieve full plate bearing.

C. Fasten columns to anchor bolts.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.02 INSTALLATION - CANOPY COVERING

A. Install in accordance with manufacturer's instructions.

B. Fasten metal decking to metal support members, aligned level and plumb.

C. Install fascia panels, trim, and flashing.

D. Separate dissimilar metals using concealed bituminous paint.

E. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.03 CLEANING

A. Clean surfaces of dust and debris; follow manufacturer's cleaning instructions for the finish used.

3.04 PROTECTION

A. Protect canopy after installation to prevent damage due to other work until Date of Substantial Completion.

END OF SECTION 10 73 16.13

SECTION 107516 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 SUMMARY

A. The section includes ground-set flagpoles made from aluminum.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Delegated-Design Submittal: For flagpoles.

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.1 WARRANTY

A. Products will be free from defects in material and/or workmanship for a period of three years from the date of invoice.

B. The warranty does not apply to damage resulting from accident, alteration, misuse, tampering, negligence, or abuse.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 013300 "Quality Requirements," to design flagpole assemblies.

B. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand design loads indicated within limits and under conditions indicated.

1. Wind Loads: Determine according to NAAMM FP 1001. Basic wind speed for Project location is 15 MPH

2.3 ALUMINUM FLAGPOLES

A. Aluminum Flagpoles: Entasis-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 1/8 inch.

B. Exposed Height: 30 feet.

C. Sleeve for Aluminum Flagpole: 16-gauge hot dip dipped galvanized steel foundation sleeve, made to fit flagpole, for casting into concrete foundation.

2.4 FITTINGS

A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 3-inch 14-gauge spun aluminum with silver anodic finish.

B. Internal Halyard: Revolving non-fouling, internal halyard truck assembly of cast aluminum with 26 stainless steel ball bearings, and 2-1/2" diameter plated steel sheave, and continuous 1/8-inch by 7 by 19-millimeter C-5425 stainless steel aircraft cable. Finish exposed metal surfaces to match flagpoles.

1. Halyards: One at each flagpole.
2. Halyard Flag Snaps: Bronze swivel snap hooks. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

A. Drainage Material: Crushed stone or crushed or uncrushed gravel; coarse aggregate.

B. Sand: ASTM C 33/C 33M, fine aggregate.

C. Elastomeric Joint Sealant: Multicomponent nonsag urethane joint sealant complying with requirements in Section 079200 "Joint Sealants."

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.6 ALUMINUM FINISHES

A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concrete pouring. Place concrete. Plumb and level foundation tube and allow concrete to cure.

D. Sleeves: Locate and secure sleeves in forms by bracing to reinforcement and forms.

E. Place concrete, as specified in Section 033000 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.

F. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

B. Foundation Tube: Place the flagpole in a tube, seated on bottom plate between steel centering wedges, and install hardwood wedges to secure the flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION 107516

SECTION 10 82 00
LOUVERED EQUIPMENT SCREENS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fixed, extruded-aluminum louvered rooftop equipment screens

1.02 REFERENCE STANDARDS

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

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

C. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2021.

D. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric); 2021.

E. ICC (IBC)-2018 - International Building Code; 2018.

1.03 DESIGN AND PERFORMANCE CRITERIA

A. General Design Criteria:
   1. Building Code: ICC (IBC)-2018
   2. Occupancy Category: IV - Essential Facilities

B. Seismic Design Criteria:
   1. Refer to Sheet S0.0 (Structural) for the following design criteria:
      a. Seismic Design Category
      b. Site Classification
      c. Seismic Force-Resisting System
      d. Seismic Loads: Spectral Response Acceleration Value (S_a)
      e. Component Importance Factor (I_e)

C. Wind-Resistance Design Criteria:
   1. Refer to Sheet S0.0 (Structural) for the following design criteria:
      a. Ultimate Design Wind Speed, V_{ult}
      b. Exposure Category
      c. Nominal Design Wind Speed, V_{asd}
      d. Surface Roughness Category

D. General Performance: Screenin assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other construction defects.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Shop Drawings: Submit detailed shop drawings, indicating component profiles, sections, finishes, fastening details, special details, and manufacturer's technical and descriptive data.

C. Submittal: Comply with structural performance requirements and design criteria indicated. Note structural design load on drawings.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: Perform structural design under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in Missouri.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Architectural Louvers Company
   1. Architectural Grilles & Sunshades, Inc: www.agsshade.com/#sle.
   2. Construction Specialties, Inc: www.c-sgroup.com/#sle.
   3. DAMS Incorporated: www.damsinc.com/#sle.
   4. Industrial Louvers, Inc: www.industriallouvers.com/#sle.
   5. Metalwerks: www.metalwerksusa.com/#sle.
   6. Nelson Industrial, Inc: www.nelsonii.com/arch/#sle.
   7. Ruskin Company: www.ruskin.com/#sle.

2.02 EXTRUDED ALUMINUM ROOFTOP EQUIPMENT SCREEN

A. Basis-of-Design Product: Architectural Louvers Co. (Harray, LLC); Model V6JF, or equivalent.
   1. Louver Blade Depth: 4 inches (100 mm)
   2. Louver Frame Depth: 6 inches (150 mm)
   3. Blade Profile: Plain blade without center baffle.
   4. Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
   5. Framing Support Nominal Thickness: Not less than 0.125 inch (3.2 mm)

B. Louver Performance Requirements:
   1. Free Area: Not less than 8.7 sq. ft. (0.81 sq. m) for 48-inch- (1220-mm-) wide by 48-inch- (1220-mm-) high louver assembly.

C. Structural: Approvals for up to 150 lbs. per sq. ft. wind loading

D. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.03 MATERIALS

A. Aluminum Extrusions: ASTM B221 (ASTM B221M) alloy 6063, temper T5, 1/8 inch minimum wall thickness.

B. Aluminum Sheet: ASTM B209 (ASTM B209M) alloy 3003, with temper as required for forming.

C. Fasteners: Use types and sizes to suit unit installation conditions.
   1. For fastening aluminum, 300 series stainless-steel fasteners.

2.04 FABRICATION

A. Join concealed frame members to each other and to fixed louver blades with threaded fasteners unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.05 FINISHES

A. High-Performance Organic Finish: 3-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
   1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's written installation instructions.

B. Set equipment screens level, plumb, with uniform joints, and in alignment with adjacent work as indicated.

C. Mechanically secure grilles to supporting structure. Provide perimeter clearances and attachments to allow for thermal expansion.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

3.02 CLEANING

A. Clean finished surfaces as recommended by manufacturer and maintain clean condition until Date of Substantial Completion.

3.03 PROTECTION

A. Protect installed grilles to ensure grilles are without damage until Date of Substantial Completion.

END OF SECTION 10 82 00

SECTION 11 40 00
FOODSERVICE EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish labor, materials and service necessary to deliver, assemble, and install foodservice equipment.

B. Connections to utilities.

1.02 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2023.

B. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

C. ASTM C1036 - Standard Specification for Flat Glass; 2021.

D. FM (AG) - FM Approval Guide; current edition.

E. ITS (DIR) - Directory of Listed Products; Current Edition.

F. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

G. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; 2027.

H. SMACNA (KVS) - Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines; 2026.

I. UL (DIR) - Online Certifications Directory; Current Edition.

1.03 REGULATIONS

A. FEC work and materials shall be in accordance with latest rules, codes and/or regulations of agencies/authorities having jurisdiction. Furnish food service equipment-related permits, approvals, and installation as required.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation Meeting:
   1. Review the project site with Contractor and verify existing conditions.
   2. FEC to coordinate with Contractor access to ensure delivery of equipment to designated areas.
   3. Contractor shall verify and coordinate height and location of piping and ductwork in areas above exhaust hoods and cold rooms.
   4. FEC and Contractor shall coordinate timely installation of walk-in cooler/freezer unit(s).
   5. Verify withGC the exact location on the roof or ground that remote refrigeration condensers, exhaust fans, and make-up air systems shall be placed.
   6. Contractor to construct condenser pad / curbs and roof sleeves to meet national and local codes. Contractor, Plumbing Contractor, Electrical Contractor and Mechanical Contractor shall verify mechanical, plumbing, electrical, and ventilation rough-in and sleeve locations as per food service drawings before floor slabs are poured and wall or ceiling sheathing is installed.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Provide data on appliances; indicate configuration, sizes, materials, finishes, locations, and utility service connection locations, service characteristics, and wiring diagrams.

C. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

D. Certificates: Certify that products of this section meet or exceed specified requirements.

E. Operation Data: Provide operating data for the specified equipment.

F. Maintenance Data: Provide lubrication and periodic maintenance requirement schedules.

G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacture of standard products of the type specified.

B. Comply with all federal, state and local laws and regulations governing health, safety, fire, mechanical and electrical requirements within the applicable jurisdiction.

C. Comply with Standards of AGA, ASHRAE, ASME, NEMA, NEC, NFPA #17A, 54, 70, and 96, NSF, OSHA and UL. All principal items of equipment shall bear the NSF seal. Use UL Listed electrical components and include UL labels.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Store products clear of floor in a manner to prevent damage.

B. Coordinate size of access and route to place of installation.

1.08 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work of this section for (1) year after the Date of Substantial Completion.

C. Provide manufacturer’s standard warranties including labor, materials, refrigerant, and incidental expenses to maintain proper operation of related equipment. Replace damaged or worn parts requiring replacement during warranty period with new parts and installed at no cost to Owner.

D. Service equipment within 48 hours by factory-trained local service agency. Perform scheduled maintenance per manufacturer’s recommendations by Owner operator at their cost.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Foodservice Equipment:
   1. Hobart Corp; ____: www.hobartcorp.com/#sle.
   2. Sani-Floor Trough Systems; Standard Floor Trough Systems: www.sanifloor.com/#sle.
   3. Vulcan Hart Corp; ____: www.vulcanhart.com/#sle.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for utility requirements.

B. Products Requiring Electrical Connection: Listed and classified by FM (AG), ITS (DIR), UL (DIR), or testing agency acceptable to local authorities having jurisdiction as suitable for the purpose specified and indicated.

2.03 EQUIPMENT

A. Equipment Schedule: Refer to schedule at end of this section.
   1. Equipment Eligible for Energy Star Rating: Provide Energy Star Rated equipment
   2. Cooler and Freezer Units: Listed by UL (DIR).
   3. Electrical Wiring and Components and Self-Contained Refrigeration Systems: Comply with UL (DIR) listed product standards.
   4. Exhaust Hoods: Comply with NFPA 96 and SMACNA (KVS).

B. Installation Accessories: Provide rough-in hardware, supports and connections, attachment devices, closure trim, and accessories as required for complete installation.

2.04 MATERIALS

A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

B. Stainless Steel Sheet: ASTM A666/A666M Type 304 commercial grade, No. 4 finish.

C. Glass: ASTM C1036 annealed, and laminated, 4 mm thick; exposed edges ground; cut or drilled to receive hardware.

D. Plastic Laminate: NEMA LD 3, HGS ; acid-resistant ; color(s) as indicated ; textured, low gloss finish.

E. Laminate Backing Sheets: NEMA LD 3, BKL; unfinished, plastic laminate.

F. Finish Hardware: Manufacturer's standard.

G. Work Surfaces: Stainless steel.

H. Fittings: Sink drains with crumb cup and waste fittings.

2.05 FINISHES

A. Components: Shop finish.

B. Metal (Except Stainless Steel): Degrease and phosphate etch, prime and apply minimum two coats factory baked epoxy, color as selected.

C. Stainless Steel: No. 4 finish.

D. Plastic Laminate.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify ventilation outlets, service connections, and supports are correct and in required location.

B. Verify that electric power is available and of the correct characteristics.

3.02 INSTALLATION

A. Assure that kitchen installation is within construction schedule. Coordinate and integrate work to prevent conflict between subcontractors.

B. Install items in accordance with manufacturers' instructions.

C. Insulate to prevent electrolysis between dissimilar metals.

D. Contractor will provide use of dumpster for disposal of packaging materials
   1. Remove daily debris from site, break down and place in General Contractor's dumpster.

E. Final connections to equipment to be made by qualified, licensed, and insured plumbing, electrical, and mechanical contractors provided by General Contractor.

F. Weld and grind joints in steel work tight, without open seams, where necessary due to limitations of sheet sizes or installation requirements.

G. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.

H. Use anchoring devices appropriate for equipment and expected usage.

3.03 REFRIGERATION SYSTEMS

A. Install refrigeration systems and connecting piping as indicated in Contract Documents in a manner that provides complete and operational systems and eliminates any noise and vibration being transmitted to any part of building.

B. Install piping to permit normal installation, service, removal of condensing units and their components and view sight glasses and allow expansion and contraction without damage to systems.

C. Take extreme care to keep entire refrigeration system clean and dry.

D. Nitrogen gas shall flow through piping being welded to prevent scaling.

E. Factory-extend refrigeration lines in a neat and orderly manner, support and securely anchor with “Unistrut”, or equal clamps and channels. Cap end of lines to prevent against contamination.

F. Pre-wire compressors and accessories to main circuit breaker control panel and provide individual circuit breakers wired to main breaker disconnect requiring single power connection. Run wiring inside code approved raceway.

G. If in the opinion of the FEC, additional ventilation is required to ensure correct operation temperatures, FEC shall so state in a letter to Owner.

H. Refrigeration line set between condensing unit and evaporator to be no more than 50 feet total length.

3.04 REFRIGERATION PIPING TESTING

A. Pressure test each system for leaks.
   1. R-404a Refrigeration: Between 250 psi and 150 psi
   2. Fully open valves during the test.

B. Test Procedures:
   1. Charge systems with refrigerant through port of liquid shut off valves of receivers to a pressure of 10 to 20 psi.
   2. Add dry nitrogen, supply of which shall be equipped with pressure regulating valve to provide the specified pressure.
   3. Carefully test for leaks using either a Halide torch or an electric Halogen leak detector.

3.05 FIRE SUPPRESSION SYSTEM

A. Provide UL 300 Listed fire suppression system for exhaust hood.

B. Upon completion, Local Fire Suppression contractor’s agent will certify system.

C. Local Fire Suppression’s contractor’s agent, at request of local Fire Marshall, performs any special test firing for an added charge.Ansul gas valve to be supplied by FEC and installed by General Contractor.

3.06 CLEANING PERFORMED BY GENERAL CONTRACTOR

A. Remove masking or protective covering from stainless steel and other finished surfaces

B. Wash and clean equipment

C. Polish glass, plastic, hardware, accessories, fixtures, and fitting.

3.07 START-UP AND DEMONSTRATION

A. Refrigeration System Start-Up:
   1. Charge each system with refrigerant listed on approved refrigeration shop drawings.
   2. Set controls and check that systems meet proper operation temperatures.
   3. Check compressor for proper oil level.
      a. Refrigeration Oil: Suniso 3G, inhibited only, delivered to the job site in sealed containers.
      b. Add oil to system to maintain 1/4-inch to 1/2-inch sight glass.
   4. Check electrical circuits by Division 26 for compliance with manufacturer’s specifications. Division 26 shall make corrections to wiring as required.
   5. Check manufacturer’s requirement for lubrication and followed requirements before operation of fan, pump motors, and other associated equipment.
   6. Review refrigeration systems, operation, maintenance, emergency procedures, and proper service procedures with Owner’s engineering staff if requested.

B. Provide to General Contractor a list of certified manufacturer service agents for start-up/calibration of equipment.

C. Coordinate with Owner any necessary equipment demonstrations.

3.08 ADJUSTING

A. Adjust equipment and apparatus to ensure proper working order and conditions.

B. Remove and replace equipment creating excessive noise or vibration.

3.09 CLEANING

A. Remove masking or protective covering from stainless steel and other finished surfaces.

B. Wash and clean equipment.

C. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

3.10 CLOSEOUT ACTIVITIES

A. At completion of work, provide qualified and trained personnel to demonstrate operation of each item of equipment and instruct Owner in operating procedures and maintenance.
   1. Test equipment prior to demonstration.
   2. Individual Performing Demonstration: Fully knowledgeable of all operating and service aspects of equipment.

3.11 PROTECTION

A. Remove protective coverings from prefinished work.

B. Protect finished work from damage.

PART 4 - EQUIPMENT

4.01 FOODSERVICE EQUIPMENT SCHEDULE

A. The foodservice equipment schedule and equipment cut sheets are attached following this page.

END OF SECTION 11 40 00

FOODSERVICE EQUIPMENT SPECIFICATION

ITEM 1, REFRIGERATOR: TWO (2) REQUIRED

Manufacturer: True (Basis of Design), Continental, Traulsen or approved equal.

Model: T-23-HC
Half height doors hinged as shown on plan.
Three (3) extra shelves
Three (3) year parts and labor warranty
Seven (7) year warranty on compressor
Cord and plug
Caters

ITEM 2, FREEZER: ONE (1) REQUIRED

Manufacturer: True (Basis of Design), Continental, Traulsen or approved equal.

Model: T-23F-HC
Three door unit w/ full height doors
Three (3) additional shelves
Three (3) year parts and labor warranty
Seven (7) year warranty on compressor
Cord and plug
Caters

ITEM 3, UNDER COUNTER DISH WASHERS: TWO (2) REQUIRED

Manufacturer: Hobart (Basis of Design), Jackson, CMA or approved equal.

Model: LXGnPR advansys
Low temperature, chemical sanitizing
ADA height to fit below 34” high counter tops
Door lock
Cord and plug

Voltage: 115-60-1

ITEM 4, GRILL: ONE (1) REQUIRED

Manufacturer: Star (Basis of Design), Vulcan, Wolf or approved equal.

Model: 748TA
Electric
Cord and plug

Voltage: 208-60-1 (VERIFY VOLTAGE)

ITEM 5, STAND: ONE (1) REQUIRED

Manufacturer: Advance Tabco (Basis of Design), Eagle, John Boos or approved equal.

Model: ES-304C

Stainless steel legs and bottom shelf
Casters with brakes

ITEM 6, RANGE: ONE (1) REQUIRED

Manufacturer: Vulcan (Basis of Design), Garland, Hatco, or approved equal.

Model: EV36S-6FP208
Casters with brakes
Cord and plug
Oversized standard oven base
Single high shelf

Voltage: 208-60-3 (VERIFY VOLTAGE)

ITEM 7, DISH MACHINE: ONE (1) REQUIRED

Manufacturer: Hobart (Basis of Design), Jackson, CMA or approved equal.

Model: AM16T-BAS-TALL
Straight Thru Installation (VERIFY connections to tables)
Tank heat
Pumped drain air gap kit (VERIFY)
Built in booster heater
Drain water tempering kit
With single point elec connection
With vent fan control
Common water connection
Tray rack

Voltage: 208/240-60-3 (VERIFY VOLTAGE)

ITEM 8, DISH TABLE: ONE (1) REQUIRED

Manufacturer: Advance Tabco (Basis of Design), Eagle, John Boos or approved equal.

Model: DTC-S30-24L
Stainless steel legs and cross rails

ITEM 9, DISH TABLE: ONE (1) REQUIRED

Manufacturer: Advance Tabco (Basis of Design), Eagle, John Boos or approved equal.

Model: DTC-S30-24R
Stainless steel legs and cross rails

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Fax (636)272-2408 • Toll Free (800)325-6152 • Intl Fax# (001)636-272-7546
Parts Dept. (800)424-TRUE • Parts Dept. Fax# (636)272-9471 • www.truemfg.com

Project Name: _____ AIA #

Location: _____ SIS #

Item #: __ #1 __ Qty: _____

Model #: _____

Model:
T-23-HC

T-Series:
Reach-In Solid Swing Door Refrigerator with Hydrocarbon Refrigerant



T-23-HC

- True's solid door reach-in's are designed with enduring quality that protects your long term investment.
- Designed using the highest quality materials and components to provide the user with colder product temperatures, lower utility costs, exceptional food safety and the best value in today's food service marketplace.
- Factory engineered, self-contained, capillary tube system using environmentally friendly R290 hydro carbon refrigerant that has zero (0) ozone depletion potential (ODP), & three (3) global warming potential (GWP).
- Oversized, factory balanced, refrigeration system holds 33°F to 38°F (.5°C to 3.3°C) for the best in food preservation.
- Stainless steel solid door and front. The finest stainless available with higher tensile strength for fewer dents and scratches.
- Adjustable, heavy duty PVC coated shelves.
- Positive seal self-closing door. Lifetime guaranteed door hinges and torsion type closure system.

Bottom mounted units feature

- "No stoop" lower shelf.
- Storage on top of cabinet.
- Compressor performs in coolest, most grease free area of kitchen.
- Easily accessible condenser coil for cleaning.

ROUGH-IN DATA

Specifications subject to change without notice.
Chart dimensions rounded up to the nearest ⅛" (millimeters rounded up to next whole number).

Model	Doors	Shelves	Cabinet Dimensions (inches) (mm) L	D	H*	HP	Voltage	Amps	NEMA Config.	Cord Length (total ft.) (total m)	Crated Weight (lbs.) (kg)
T-23-HC	1	3	27 686	29½ 750	78⅜ 1991	⅓ ⅓	115/60/1 230-240/50/1	3.0 2.4	5-15P ▲	9 2.74	280 127

* Height does not include 5" (127 mm) for castors or 6" (153 mm) for optional legs.

▲ Plug type varies by country.

MADE IN USA SINCE 1945 · 5 YEAR COMPRESSOR WARRANTY USA · c UL us · NSF · CE · natural refrigerant.

3/15 Printed in U.S.A.

APPROVALS:

AVAILABLE AT:

Model:
T-23-HC

T-Series:
Reach-In Solid Swing Door Refrigerator with Hydrocarbon Refrigerant

STANDARD FEATURES

DESIGN
- True's commitment to using the highest quality materials and optimized refrigeration systems provides the user with colder product temperatures, lower utility costs, exceptional food safety and the best value in today's food service marketplace.

REFRIGERATION SYSTEM
- Factory engineered, self-contained, capillary tube system using environmentally friendly R290 hydro carbon refrigerant that has zero (0) ozone depletion potential (ODP), & three (3) global warming potential (GWP).
- Evaporator coil balanced with higher horsepower compressor and large condenser; maintains 33°F to 38°F (0.5°C to 3.3°C) for the best in food preservation.
- Sealed evaporator fan motors and larger fan blades give True reach-in's a more efficient airflow design. This unique design ensures faster temperature recovery and shorter run times in the busiest of food service environments.
- Bottom mounted condensing unit positioned for easy maintenance. Compressor runs in coolest and most grease free area of the kitchen. Allows for storage area on top of unit.

CABINET CONSTRUCTION
- Exterior - Stainless steel front. Anodized quality aluminum ends, back and top.
- Interior - attractive, NSF approved, clear coated aluminum liner. Stainless steel floor with coved corners.
- Insulation - entire cabinet structure and solid door are foamed-in-place using Ecomate. A high density, polyurethane insulation that has zero ozone depletion potential (ODP) and zero global warming potential (GWP).
- Welded, heavy duty steel frame rail, black powder coated for corrosion protection.
- Frame rail fitted with 4" (102 mm) diameter stem castors - locks provided on front set.

DOOR
- Stainless steel exterior with white aluminum liner to match cabinet interior. Door extends full width of cabinet shell. Door locks standard.
- Lifetime guaranteed recessed door handle. Door fitted with 12" (305 mm) long recessed handle that is foamed-in-place with a sheet metal interlock to ensure permanent attachment.
- Positive seal self-closing door. Lifetime guaranteed door hinges and torsion type closure system.
- Magnetic door gasket of one piece construction, removable without tools for ease of cleaning.

SHELVING
- Three (3) adjustable, heavy duty PVC coated wire shelves 22⅞"L x 23¼"D (582 mm x 591 mm). Four (4) chrome plated shelf clips included per shelf.
- Shelf support pilasters made of same material as cabinet interior; shelves are adjustable on ½" (13 mm) increments.

LIGHTING
- Interior lighting - safety shielded. Lights activated by rocker switch mounted above door.

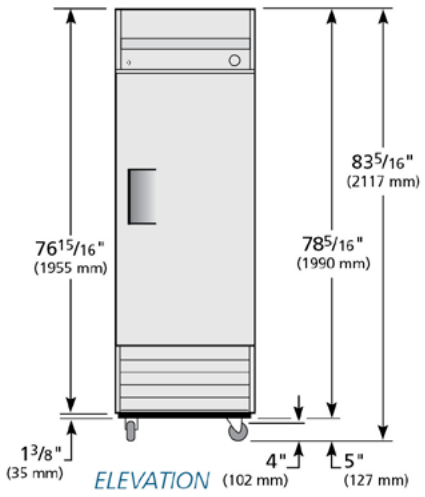
MODEL FEATURES
- Exterior temperature display.
- Evaporator is epoxy coated to eliminate the potential of corrosion.

ELECTRICAL
- Unit completely pre-wired at factory and ready for final connection to a 115/60/1 phase, 15 amp dedicated outlet. Cord and plug set included.

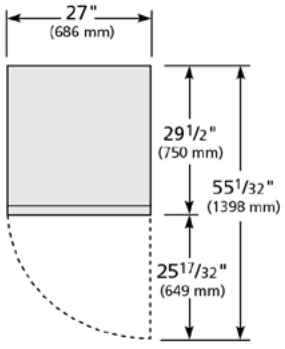

115/60/1
NEMA-5-15R

OPTIONAL FEATURES/ACCESSORIES
Upcharge and lead times may apply.
- ❑ 230 - 240V / 50 Hz.
- ❑ 6" (153 mm) standard legs.
- ❑ 6" (153 mm) seismic/flanged legs.
- ❑ Alternate door hinging (factory installed).
- ❑ Additional shelves.
- ❑ Half door bun tray racks. Each holds up to eleven 18"L x 26"D (458 mm x 661 mm) sheet pans (sold separately).
- ❑ Full door bun tray rack. Holds up to twenty-two 18"L x 26"D (458 mm x 661 mm) sheet pans (sold separately).

PLAN VIEW



ELEVATION



PLAN VIEW

WARRANTY*
Three year warranty on all parts and labor and an additional 2 year warranty on compressor. (U.S.A. only)

*RESIDENTIAL APPLICATIONS: TRUE assumes no liability for parts or labor coverage for component failure or other damages resulting from installation in non-commercial or residential applications. Units with R290 refrigerant are not approved by UL/EPA for use in residential applications.

METRIC DIMENSIONS ROUNDED UP TO THE NEAREST WHOLE MILLIMETER

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Model	Elevation	Right	Plan	3D	Back
T-23-HC	TFEY53E	TFEY03S	TFEY03P	TFEY633	

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Project Name: _____ *AIA #*

Location: _____ *SIS #*

Item #: _ #2 ___ *Qty:* _____

Model #: _____

Model:
T-23F-HC

T-Series:
Reach-In Solid Swing Door Freezer with Hydrocarbon Refrigerant



T-23F-HC

- True's solid door reach-in's are designed with enduring quality that protects your long term investment.
- Designed using the highest quality materials and components to provide the user with colder product temperatures, lower utility costs, exceptional food safety and the best value in today's food service marketplace.
- Extra large evaporator coil balanced with higher horsepower compressor and large condenser maintains -10°F (-23.3°C) cabinet temperatures. Ideally suited for both frozen foods and ice cream.
- Stainless steel solid door and front. The very finest stainless with higher tensile strength for fewer dents and scratches.
- Adjustable, heavy duty PVC coated shelves.
- Positive seal self-closing door. Lifetime guaranteed door hinges and torsion type closure system.
- Automatic defrost system time-initiated, temperature-terminated. Saves energy consumption and provides shortest possible defrost cycle.

Bottom mounted units feature:

- "No stoop" lower shelf.
- Storage on top of cabinet.
- Compressor performs in coolest, most grease free area of kitchen.
- Easily accessible condenser coil for cleaning.

ROUGH-IN DATA

Specifications subject to change without notice.
Chart dimensions rounded up to the nearest ⅛" (millimeters rounded up to next whole number).

Model	Doors	Shelves	Cabinet Dimensions (inches) (mm) W	D	H*	HP	Voltage	Amps	NEMA Config.	Cord Length (total ft.) (total m)	Crated Weight (lbs.) (kg)
T-23F-HC	1	3	27 686	29½ 750	78⅜ 1991	½ ½	115/60/1 220-240V/50Hz	3.7 2.2	5-15P ▲	9 2.74	295 134

* Height does not include 5" (127 mm) for castors or 6" (153 mm) for optional legs.

▲Plug type varies by country.

MADE WITH INNOVATION IN THE USA · 5 YEAR COMPRESSOR WARRANTY USA · ENERGY STAR · c UL us · CE · natural refrigerant.

5/20 Printed in U.S.A.

APPROVALS:

AVAILABLE AT:

Model:
T-23F-HC

T-Series:
Reach-In Solid Swing Door Freezer with Hydrocarbon Refrigerant

STANDARD FEATURES

DESIGN
- True's commitment to using the highest quality materials and oversized refrigeration systems provides the user with colder product temperatures, lower utility costs, exceptional food safety and the best value in today's food service marketplace.

REFRIGERATION SYSTEM
- Factory engineered, self-contained, capillary tube system using environmentally friendly R290 hydro carbon refrigerant that has zero (0) ozone depletion potential (ODP), & three (3) global warming potential (GWP).
- Extra large evaporator coil balanced with higher horsepower compressor and large condenser; maintains -10°F (-23.3°C). Ideally suited for both frozen foods and ice cream.
- State of the art, electronically commutated evaporator and condenser fan motors. ECM motors operate at higher peak efficiencies and move a more consistent volume of air which produces less heat, reduces energy consumption and provides greater motor reliability.
- Bottom mounted condensing unit positioned for easy cleaning. Compressor runs in coolest and most grease free area of the kitchen. Allows for storage area on top of unit.
- Automatic defrost system time-initiated, temperature-terminated. Saves energy consumption and provides shortest possible defrost cycle.

CABINET CONSTRUCTION
- Exterior - Stainless steel front. Anodized quality aluminum ends. Corrosion resistant GalFan coated steel back.
- Interior - attractive, NSF approved, clear coated aluminum liner. Stainless steel floor with coved corners.
- Insulation - entire cabinet structure and solid door are foamed-in-place using a high density, polyurethane insulation that has zero ozone depletion potential (ODP) and zero global warming potential (GWP).
- Welded, heavy duty steel frame rail, black powder coated for corrosion protection.
- Frame rail fitted with 4" (102 mm) diameter stem castors - locks provided on front set.

DOOR
- Stainless steel exterior with clear aluminum liner to match cabinet interior. Door extend full width of cabinet shell. Door lock standard.
- Lifetime guaranteed recessed door handle. Door fitted with 12" (305 mm) long recessed handle that is foamed-in-place with a sheet metal interlock to ensure permanent attachment.
- Positive seal self-closing door. Lifetime guaranteed door hinges and torsion type closure system.
- Magnetic door gasket of one piece construction, removable without tools for ease of cleaning.

SHELVING
- Three (3) adjustable, heavy duty PVC coated wire shelves 22 7/8"L x 23 1/4"D (582 mm x 591 mm). Four (4) chrome plated shelf clips included per shelf.
- Shelf support pilasters made of same material as cabinet interior; shelves are adjustable on 1/2" (13 mm) increments.

LIGHTING
- Interior lighting - safety shielded. Lights activated by rocker switch mounted above door.

MODEL FEATURES
- Exterior temperature display.
- Evaporator is epoxy coated to eliminate the potential of corrosion.
- Rear airflow guards prevent product from blocking optimal airflow.
- NSF/ANSI Standard 7 compliant for open food product.

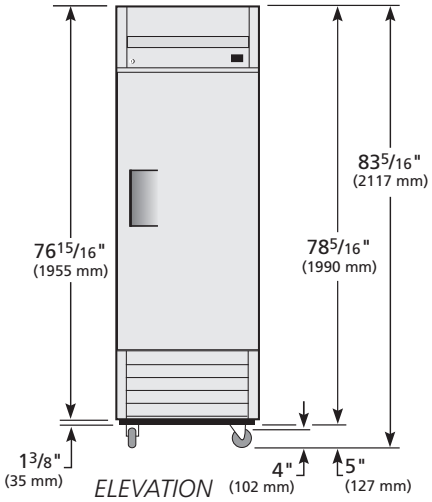
ELECTRICAL
- Unit completely pre-wired at factory and ready for final connection to a 115/60/1 phase, 15 amp dedicated outlet. Cord and plug set included.



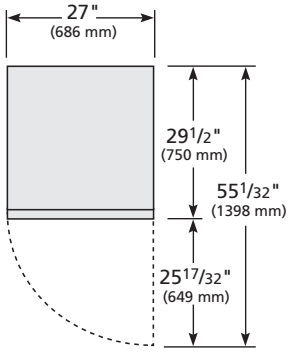
115/60/1
NEMA-5-15R

OPTIONAL FEATURES/ACCESSORIES
Upcharge and lead times may apply.
- ❑ 220-240V/50Hz
- ❑ 6" (153 mm) standard legs.
- ❑ 6" (153 mm) seismic/flanged legs.
- ❑ Alternate door hinging (factory installed).
- ❑ Novelty baskets.
- ❑ Additional shelves.

PLAN VIEW



ELEVATION



PLAN VIEW

3 YEAR PARTS + LABOR
7 YEAR COMPRESSOR
WARRANTY
(U.S.A. only)

METRIC DIMENSIONS ROUNDED UP TO THE NEAREST WHOLE MILLIMETER

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

Model	Elevation	Right	Plan	3D	Back
T-23F-HC	TFEY53E	TFEY03S	TFEY03P	TFEY633	

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HOBART

Project _____

AIA # _____ SIS # _____

Item # ____ #3 Quantity _____ C.S.I. Section 114000

COMMERCIAL DISHWASHERS

LXGnPR advansys
CHEMICAL SANITIZING
ADA-Compliant



c UL us NSF ENERGY STAR

SPECIFIER STATEMENT

Specified unit will be a NSF rated, ADA compliant Advansys undercounter glass washer with PuriRinse, chemical sanitization. Up to 38 racks per hour, 1.14 gallons per cycle, AutoClean, color touchscreen with Wi-Fi and SmartConnect App connectivity, low temperature and chemical alerts, advanced diagnostics and service connection, detergent, rinse aid, and sanitizer pumps. Constructed of stainless steel.

1 year parts and labor warranty.

STANDARD FEATURES

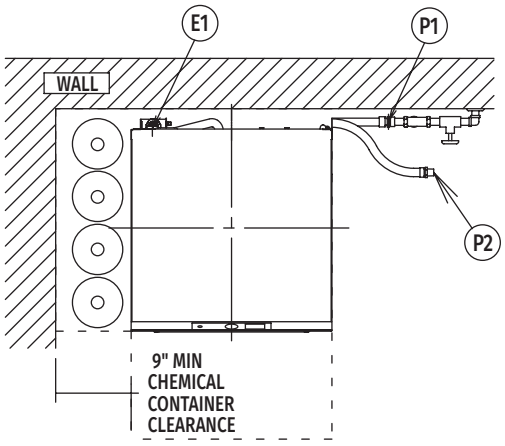
+ ADA compliant – compact 31" unit height fits easily under 34" ADA countertops
+ 12" door opening
+ Racks per hour – Light 38 / Normal 29
+ 1.14 gallons of water per cycle
+ PuriRinse cycle (potable water rinse to remove chemical residue)
+ AutoClean cycle washes down inside of machine at shutdown
+ User-friendly smart touchscreen controls
+ Wi-Fi connectivity
+ SmartConnect App with machine status, temperature logs, error code reporting, and usage analysis
+ Temperature and chemical alerts (lockouts available)
+ Chemical pumps with auto-prime for detergent, rinse aid, and sanitation
+ Delime notification with cycle
+ Soft start to protect glassware
+ Advanced diagnostics and service connection
+ Deep drawn stainless steel tank
+ Revolving upper and lower anti-clogging interchangeable wash arms
+ Snap-in revolving upper and lower interchangeable rinse arms
+ 2-stage wash tank filtration
+ Energy saver mode
+ Automatic pumped rinse and drain
+ Automatic fill
+ Electric tank heat
+ One glass/wine rack

OPTIONS & ACCESSORIES (Available at extra cost)

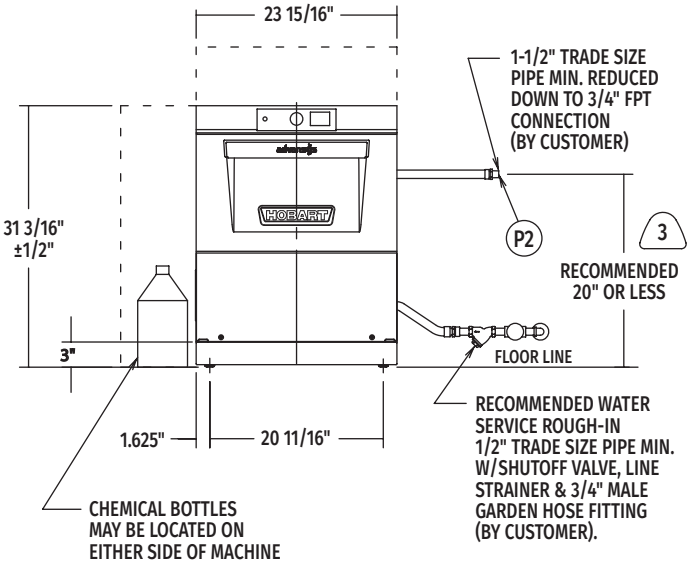
❑ Door lock (prevents door from opening until completion of cycle)
❑ Splash reduction panel
❑ Water hammer arrestor kit

LXn SERIES – LXGnPR advansys CHEMICAL SANITIZING

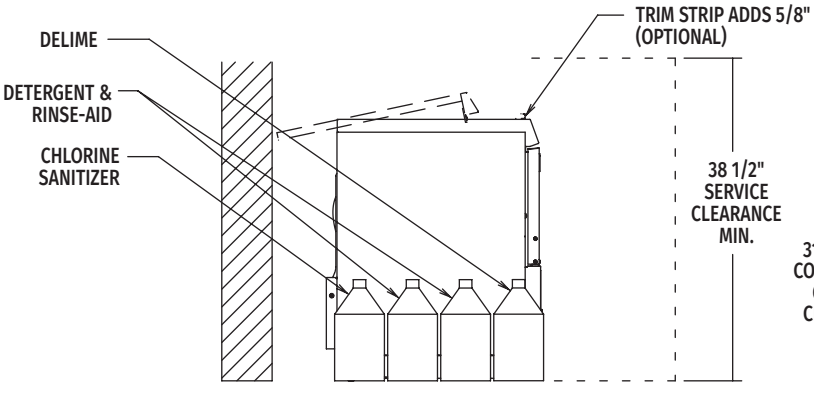
Approved by_____ Date_____ Approved by_____ Date_____



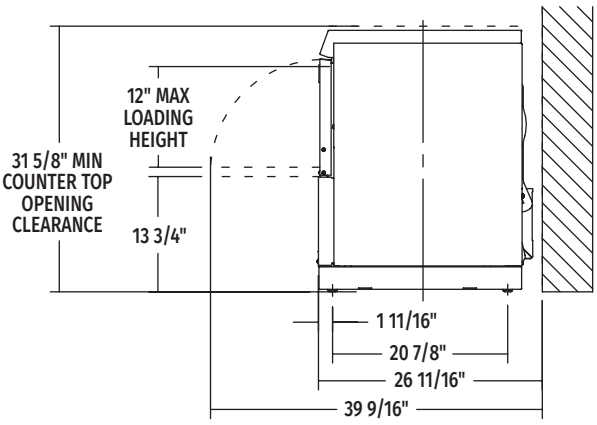
Top View



Front View



Left Side View



Right Side View

MODEL:
LXG*n*PR-ADA
00-563663
REV: A3

CAD and/or Revit Files Available

HOBART

LEGEND

Electrical Connections	
E1	Electrical connection: 1-3/8" dia. hole for 1" trade size conduit; 10-5/8" AFF.
Plumbing Connections	
P1	Single fill and rinse connection: 3/4" female garden hose fitting on 6' long hose supplied with machine; 120°F water minimum for LXG*n*PR, 140°F recomended.
P2	Common drain connection: 5/8" barb fitting with 6' long hose supplied with machine.

WARNING: Do not premix chemicals and sodium hypochlorite (liquid bleach). Mixing may cause hazardous gas to form.

Electrical and grounding connections must comply with the applicable portions of the National Electrical Code and/or other local electrical codes.

Plumbing connections must comply with applicable sanitary, safety and plumbing codes. Drain and fill line configurations vary, some methods are shown on this drawing.

SPECIFICATIONS

Capacities
- Cycle Time (seconds) . . . . . Light 96 / Normal 125
- Racks per Hour . . . . . Light 38 / Normal 29
- Tank Capacity – Gallons 2.9

Motor Horsepower
- Wash 0.85
- Rinse 0.19

Water Consumption
- U.S. Gallons per Cycle 1.14
- U.S. Gallons per Hour (maximum use) 33.0
- Peak Drain Flow – U.S. Gallons per Minute 4.0

Temperatures °F
- Incoming Water Temperature (minimum) 120

Heating
- Tank Heat, electric (kW) 1.8

Standard 20" x 20" Rack Complement
- Wine/glass 1

Shipping Weight (approximate) . . . . . 180 lbs.

Crated Dimensions . . . . . 27"W x 30"L x 40"H

Heat Output, BTU/Hour	
Latent	Sensible
1,900	800

(E1) Standard Electrical Options

Tank Heat, Booster, Pump & Controls			
Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Protective Device
120/60/1	14.9	20	20

NOTE: For supply connections, use copper wire only rated at 90°C minimum.

Dishmachine not provided with internal GFCI protection.

NOTICE

Required flowing water pressure to the dishmachine is 15-65 PSIG. If pressures higher than 65 PSIG are present, a pressure regulating valve must be installed in the water line to the dishmachine.

Pressure gauge not required on pumped rinse machines.

Important: The chemical containers should be placed no higher than 16" above floor.

If chemical containers are to be placed in cabinet adjacent to machine, a 1/2" dia. hole is required in the cabinet to run chemical supply line.

Use only 6% or 8.4% sodium hypochlorite (liquid bleach) as sanitizing chemical to insure proper operation of dishmachine.

Certain materials including silver plate, aluminum and pewter are attacked by sodium hypochlorite (liquid bleach). See instructional manual.

Notes:

1. All vertical machine dimensions taken from floor may be increased by 1".
2. Moist air escapes from the door. Use only moisture resistant materials adjacent to dishmachine sides and top.
3. A vent hood is not recommended above the undercounter dishmachine since it does not produce excessive vapors.

Plumbing Notes:

1. Water hammer arrestor (meeting ASSE-1010 Standard or equivalent) to be supplied (by others) in common water supply line at service connection.
2. Recommended water hardness to be 3 grains or less for best results.
3. If drain hose is looped above a sink, the loop must not exceed 41" AFF.
4. Backflow prevention provided by NSF-approved air gap device.

Miscellaneous Note:

1. For optimal performance, Hobart recommends maintaining a dishroom temperature of 65°F (18°C) or higher, as lower temperatures may hinder the machine's capacity to operate effectively (with lower performance as ambient temperature decreases).

As continued product improvement is a policy of Hobart, specifications are subject to change without notice.

New ULTRA-MAX® ELECTRIC GRIDDLES

Models 724TA, 736TA, 748TA, 760TA & 772TA

Features/Benefits:

- ★ Ultra-Max griddles are designed for the highest volume food service operations and provide maximum performance and reliability.
- ★ Snap action thermostatic control adjusts from 150° to 450°F and provides accurate temperature control. Internal plate sensor accurately measures the temperature of the griddle plate 3/16" from the cooking surface for instant response to surface temperature change and fast recovery.
- ★ Available in 24", 36", 48", 60" and 72" widths to meet your space and volume requirements.
- ★ *NEW* longer lasting, heavy-duty metal knobs.
- ★ Highly polished 1" thick steel plate for superior heat distribution, fast recovery and energy efficient operation.
- ★ Custom designed 4350 watt heating element every 12" of cooking surface provides superior cooking performance.
- ★ Heavy-duty all-weld body construction with stainless steel front, side panels, bull nose and splash guard.
- ★ Heavy-duty design with stylishly curved, ergonomically advanced front panel providing easy access and viewing of controls.
- ★ Spatula wide 3-1/2" front grease trough and grease chute for easier cleaning.
- ★ Large 6 quart stainless steel grease drawer.
- ★ Extra-heavy-duty 4" adjustable legs to fit your countertop needs.
- ★ Floor model stands available for free standing unit. Optional casters available.
- ★ Cool-to-the-touch stainless steel bull nose front provides knob protection and comfortable work zone.



Model 736TA

Applications:

For breakfast, lunch or dinner, the Ultra-Max electric snap action griddles provide flexibility for a variety of menu items. Perfect for high volume operations.

Construction:

Ultra-Max griddles feature 1" thick highly polished steel griddle plate, 5" tapered stainless steel splash guard, 3-1/2" wide front access stainless steel grease trough, stainless steel 6 quart capacity grease drawer, and stainless steel front panels, side panels, and bull nose. Models 760TA and 772TA house two 6 quart grease drawers. Includes a 4350 watt element every 12" of width controlled by snap action electric thermostat. Griddles are equipped with a junction box at the rear for making electrical connections. Models 760TA and 772TA are equipped with 2 junction boxes. Heavy-duty 4" legs are included.

New Warranty:

Ultra-Max gas griddles are covered by Star's **THREE YEAR** parts and labor warranty.

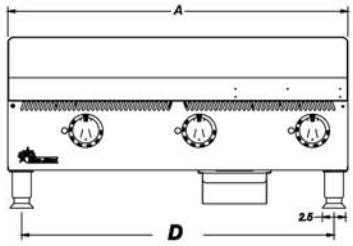
Star Manufacturing - 10 Sunnen Drive - P.O. Box 430129 - St. Louis, MO 63143-3800
Phone: (314) 678-6303 - FAX: (314) 781-5445 - www.star-mfg.com

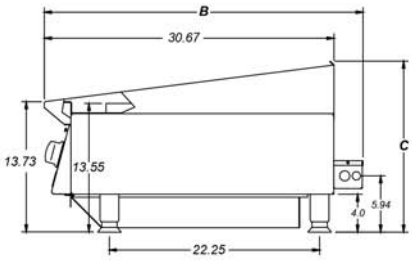
Star Manufacturing

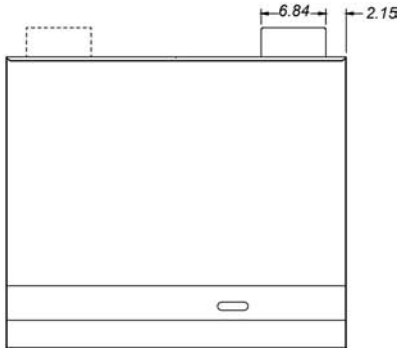
Ultra-Max® Electric Griddles

New ULTRA-MAX® ELECTRIC GRIDDLES

Models 724TA, 736TA, 748TA, 760TA & 772TA







Specifications

Model No.	Dimensions (A) Width Inches	(B) Depth Inches	(C) Height Inches	(D) Leg Width Inches	No. Controls	Watts	Grid Area	Plate Thickness	Approximate Installed	Weight Shipping
724TA	24" (61 cm)	33-11/16" (85.5 cm)	18" (45.7 cm)	21-1/16" (53.5)	2	8,700 (3,697sq cm)	573 sq. in. (2.54 cm)	1" (99.7 kg)	220 lbs. (130.5kg)	290 lbs.
736TA	36" (91.4 cm)	33-11/16" (85.5 cm)	18" (45.7 cm)	33-1/16" (84)	3	13,050 (5,545 sq cm)	860 sq. in. (2.54 cm)	1" (149.5 kg)	330 lbs. (175.1 kg)	389 lbs.
748TA	48" (121.9cm)	33-11/16" (85.5 cm)	18" (45.7 cm)	45-1/16" (114.5)	4	17,400 (7,394 sq cm)	1146 sq. in. (2.54 cm)	1" (199.4 kg)	440 lbs. (234 kg)	520 lbs.
760TA	60" (152.4 cm)	33-11/16" (85.5 cm)	18" (45.7 cm)	57-1/16" (144.9)	5	21,750 (9,242 sq cm)	1433 sq. in. (2.54 cm)	1" (249.2 kg)	550 lbs. (295.2 kg)	656 lbs.
772TA	72" (182.9 cm)	33-11/16" (85.5 cm)	18" (45.7 cm)	69-1/16" (175.4)	6	26,100 (11,091 sq cm)	1719 sq. in. (2.54 cm)	1" (299.0 kg)	660 lbs. (351 kg)	780 lbs.

Electrical Data

Model	Total KW	Voltage	AMPS-1 Phase	KW.-Load Phase X-Y	KW.-Load Phase X-Z	KW.-Load Phase Y-Z	AMPS Per Phase X	AMPS Per Phase Y	AMPS Per Phase Z
724TA	8.7	208	41.8	4.35	-	4.35	20.9	36.2	20.9
	8.7	240	36.3	4.35	-	4.35	18.1	31.3	18.1
736TA	13.05	208	62.7	4.35	4.35	4.35	36.2	36.2	36.2
	13.05	240	54.4	4.35	4.35	4.35	31.4	31.4	31.4
748TA	17.4	208	83.6	8.7	4.35	4.35	55.3	55.3	36.2
	17.4	240	72.5	8.7	4.35	4.35	48	48	31.4
760TA**	21.8	208	Dual Supply: 62.7 A. One Circuit & 41.8 A. Other Circuit	4.35	4.35	4.35	36.2	36.2	36.2
				4.35	-	4.35	20.9	36.2	20.9
	21.8	240	Dual Supply: 54.4 A. One Circuit & 36.3 A. Other Circuit	4.35	4.35	4.35	31.4	31.4	31.4
				4.35	-	4.35	18.1	31.3	18.1
772TA**	26.1	208	Dual Supply 62.7 EA. Circuit	4.35 ea.	4.35ea.	4.35 ea.	36.2 ea.	36.2 ea.	36.2 ea.
	26.1	240	Dual Supply 54.4 EA. Circuit	4.35 ea.	4.35ea.	4.35 ea.	31.4 ea.	31.4 ea.	31.4 ea.

****INDICATES DUAL SUPPLY CIRCUITS**

Typical Specifications

Gas griddles are constructed of stainless steel. Control knobs are protected by a stainless steel bull nose front. Griddle plate is a 1" (2.54 cm) thick highly polished steel plate with 5" (12.7 cm) high tapered wrap-around stainless steel splash guard. Unit has 3-1/2" (8.3 cm) wide front grease trough with grease chute and a 6 qt. (5.68 L) capacity stainless steel grease drawer. Models 760TA and 772TA house two each 6 quart (5.68 L) grease drawers. Units are equipped with a 4350 watt incoloy sheath element every 12" (330.48 cm) of griddle width and are controlled by a snap action thermostat. A terminal block is provided for making electrical connections. Models 760TA and 772TA are equipped with two electric connection boxes. Griddles are supplied with 4" (10.2 cm) high stainless steel legs that have a 1-5/8" (1.5 cm) adjustment. Units are approved for installation within 1" (2.54 cm) of side and rear wall combustible surfaces and are cULus Classified and UL classified to NSF Standard 4 Sanitation. Printed in the U.S.A.

Due to periodic changes in designs, methods, procedures, policies and regulations, the specifications contained in this sheet are subject to change without notice. While Star Manufacturing exercises good faith efforts to provide information that is accurate, we are not responsible for errors or omissions in information provided or conclusions reached as a result of using the specifications. By using the information provided, the user assumes all risks in connection with such use.

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Phone: (314) 678-6303 - FAX: (314) 781-5445 - www.star-mfg.com

ADVANCE TABCO
SMART FABRICATION™

STAINLESS STEEL

EQUIPMENT STANDS

Item #: #5 Qty #: _____

Model #: _____

Project #: _____



FEATURES: (as it applies)

TOP is furnished with 1" hemmed edge turned up at both sides; 1" turn up at rear.

Aluminum die cast "leg to shelf" clamp secures shelf to leg eliminating unsightly nuts and bolts.

Undershelf is adjustable.

CONSTRUCTION:

All TIG welded. Exposed weld areas finished to match adjacent surfaces.

Entire Top is mechanically polished to a satin finish and is sound deadened.

Roll formed embossed galvanized hat channels are secured to top by means of structural adhesive and weld studs.

Gussets welded to support hat sections.

MATERIAL:

ES-Series Stainless Steel Base

TOP is 14 gauge stainless steel type "304" series with galvanized understructure.

SHELF is 18 gauge stainless steel.

LEGS are 1 5/8" diameter heavy gauge tubular stainless steel with stainless steel gussets and 1" adjustable stainless steel bullet feet.

EG-Series Galvanized Base

TOP is 14 gauge stainless steel type "304 series with galvanized understructure.

SHELF is 18 gauge galvanized steel.

LEGS are 1 5/8" diameter tubular galvanized steel with galvanized steel gussets and 1" adjustable plastic bullet feet.

LEGS WITH CASTERS ("C" Series) are 1 5/8" diameter tubular galvanized steel with galvanized steel gussets and TA-255 Heavy Duty Urethane Casters.

OPTIONAL:

Laminated Hardwood Cutting Board is secured to stainless steel channels. Channels are welded to a stainless steel one-piece L-shaped tubular support which in turn is welded to a stainless steel sliding collar for height adjustments.

18 Gauge stainless steel Plate Shelf secured to stainless steel gusset and attached to stainless steel sliding collar for height adjustment.

2" thick stainless steel cutting surface welded to a stainless steel one-piece L-shaped tubular support which in turn is welded to a stainless steel sliding collar for height adjustments.

	L	24" Wide	Wt.	30" Wide	Wt.	30" Wide w/Casters	Wt.
STAINLESS STEEL	24"	ES-242	45 lbs.	ES-302	51 lbs.	ES-302C	66 lbs.
	36"	ES-243	60 lbs.	ES-303	68 lbs.	ES-303C	83 lbs.
	48"	ES-244	77 lbs.	ES-304	85 lbs.	ES-304C	100 lbs.
	60"	ES-245	86 lbs.	ES-305	102 lbs.	ES-305C	117 lbs.
	72"	ES-246	104 lbs.	ES-306	119 lbs.	ES-306C	134 lbs.
	84"	ES-247	112 lbs.	ES-307	142 lbs.	-	-
	96"	ES-248	137 lbs.	ES-308	164 lbs.	-	-
GALVANIZED	24"	EG-242	45 lbs.	EG-302	51 lbs.	-	-
	36"	EG-243	60 lbs.	EG-303	68 lbs.	-	-
	48"	EG-244	77 lbs.	EG-304	85 lbs.	-	-
	60"	EG-245	86 lbs.	EG-305	102 lbs.	-	-
	72"	EG-246	104 lbs.	EG-306	119 lbs.	-	-
	84"	EG-247	112 lbs.	EG-307	142 lbs.	-	-
	96"	EG-248	137 lbs.	EG-308	164 lbs.	-	-

OPTIONAL ACCESSORIES*

	1 1/2" WOOD CUTTING BOARD		PLATE SHELF	
L	24" Wide	Wt.	24" Wide	Wt.
24"	TA-922	28 lbs.	TA-962	22 lbs.
36"	TA-923	30 lbs.	TA-963	24 lbs.
48"	TA-924	34 lbs.	TA-964	27 lbs.
60"	TA-925	37 lbs.	TA-965	31 lbs.
72"	TA-926	40 lbs.	TA-966	40 lbs.
84"	TA-927	56 lbs.	TA-967	50 lbs.
96"	TA-928	64 lbs.	TA-968	57 lbs.

**Wood Cutting Board, Stainless Steel Cutting Surface & Plate Shelf Are Adjustable*



HEAVY DUTY CASTERS
Available on 2' - 6'
ES Series Equipment Stands



Featuring as Standard:
"THE PROVEN"
Original Advance Tabco
Adjustable Undershelf w/
Die Cast Leg Clamp

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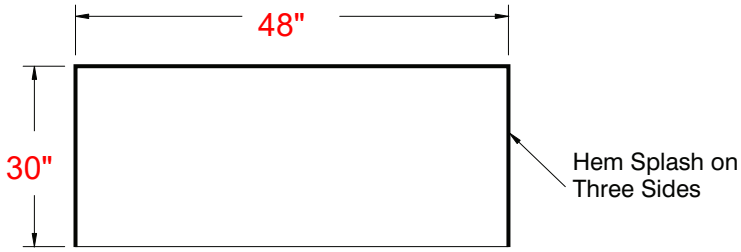
DETAILS and SPECIFICATIONS

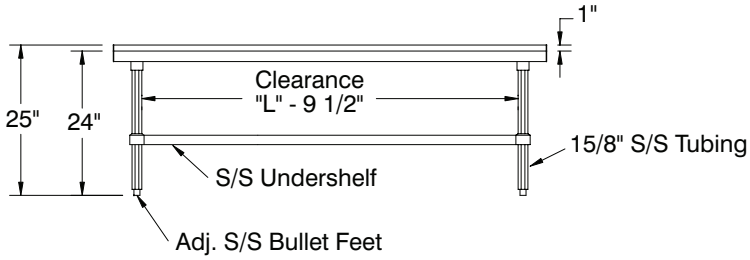
TOL ± .500”

ALL DIMENSIONS ARE TYPICAL

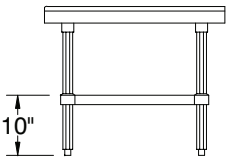
7 ft. units and longer are furnished with six (6) legs.

Maximum Total Load = 1000 lbs.



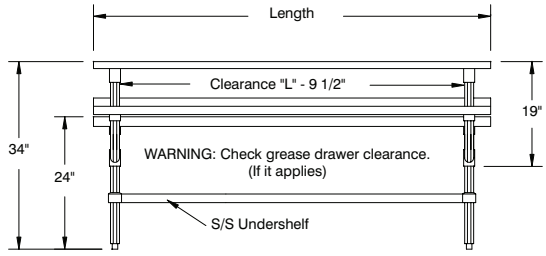


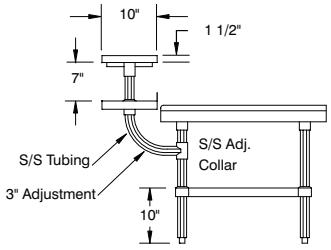
24” Working Height



with Plate Shelf & Wood Cutting Surface

Maximum Load Weight for Plate Shelf is 25 lbs.

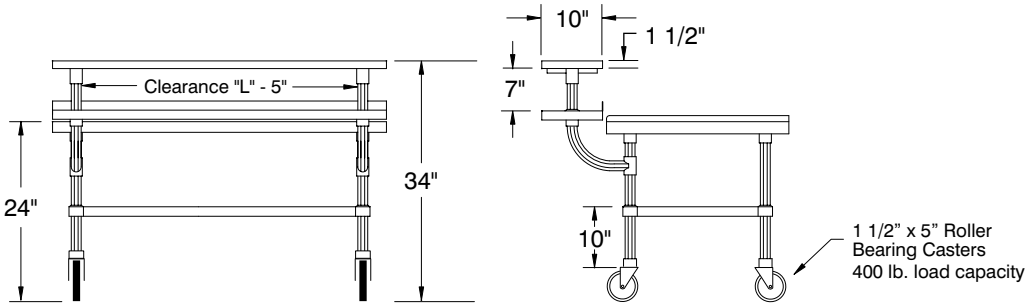




Wood Cutting Board

Mobile Unit

Optional X.H.D. Casters
TA-255 Set of 4
TA-256 Set of 6
Each Set supplied
with 2 brakes.



ADVANCE TABCO
SMART FABRICATION™

325 Wireless Boulevard, Hauppauge, NY 11788

ADVANCE TABCO is constantly engaged in a program of improving our products. Therefore, we reserve the right to change specifications without prior notice.

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Item # ___ #6 _____ C.S.I. Section 11420

RESTAURANT RANGES

36" ELECTRIC RESTAURANT RANGE
6 FRENCH PLATES



Model EV36S-6FP208
shown with adjustable legs

☐ **EV36S-6FP208**	6 French Plates / Standard Oversized Oven / 208V
☐ **EV36S-6FP240**	6 French Plates / Standard Oversized Oven / 240V
☐ **EV36S-6FP480**	6 French Plates / Standard Oversized Oven / 480V

STANDARD FEATURES

- Fully MIG welded aluminized steel frame for added durability
- Stainless steel front, sides, back riser, shelf and legs
- Six 9½" round, 2 KW French plates with infinite heat control switches. Four position heat switch on 480 volt.
- 5 KW oven with top browning control
- One standard oversized oven, interior measures 26½"w x 26⅜"d x 14"h
- Full width pull out stainless steel crumb tray
- Thermostat adjusts from 200°F to 500°F
- Cool to the touch control knobs
- One oven rack and three rack positions
- 18" x 26" sheet pans fit side to side and front to back
- Requires 208, 240 or 480 volt, 1 or 3 phase power supply. (Ranges shipped in 3 phase and are field convertible to single phase)
- One year limited parts and labor warranty

ACCESSORIES (Packaged & Sold Separately)

- ☐ Extra oven rack with two rack guides
- ☐ Set of four casters (two locking)
- ☐ 10" stainless steel stub back
- ☐ ESB36 salamander broiler
- ☐ Reinforced high shelf for ESB36 salamander broiler
- ☐ Towel bar
- ☐ Cutting board
- ☐ Condiment rail
- ☐ Fryer shield

SPECIFICATIONS

36" wide electric restaurant range, Vulcan Model No. EV36S-6FP208. Fully MIG welded aluminized steel frame for added durability. Stainless steel front, sides, back riser, plate shelf and 6" adjustable legs. Six 9½" round French plates, 2 KW input per plate. Full width pull out stainless steel crumb tray located beneath the cooking top. Comes with one standard oversized oven. Oven interior measures 26½"w x 26⅜"d x 14"h. Comes with one oven rack and three rack positions. Oven door is heavy duty with an integrated door hinge / spring mechanism, requiring no adjustments. 5 KW input. Top browning heat control. Thermostat adjusts from 200°F to 500°F. Oven controls are protected from heat in an insulated side compartment. Requires 208, 240 or 480 volt, 1 or 3 phase power supply. All ranges are shipped in 3 phase and are field convertible to single phase.

Exterior Dimensions:
34"d x 36"w x 58"h on 6" adjustable legs

a division of ITW Food Equipment Group LLC

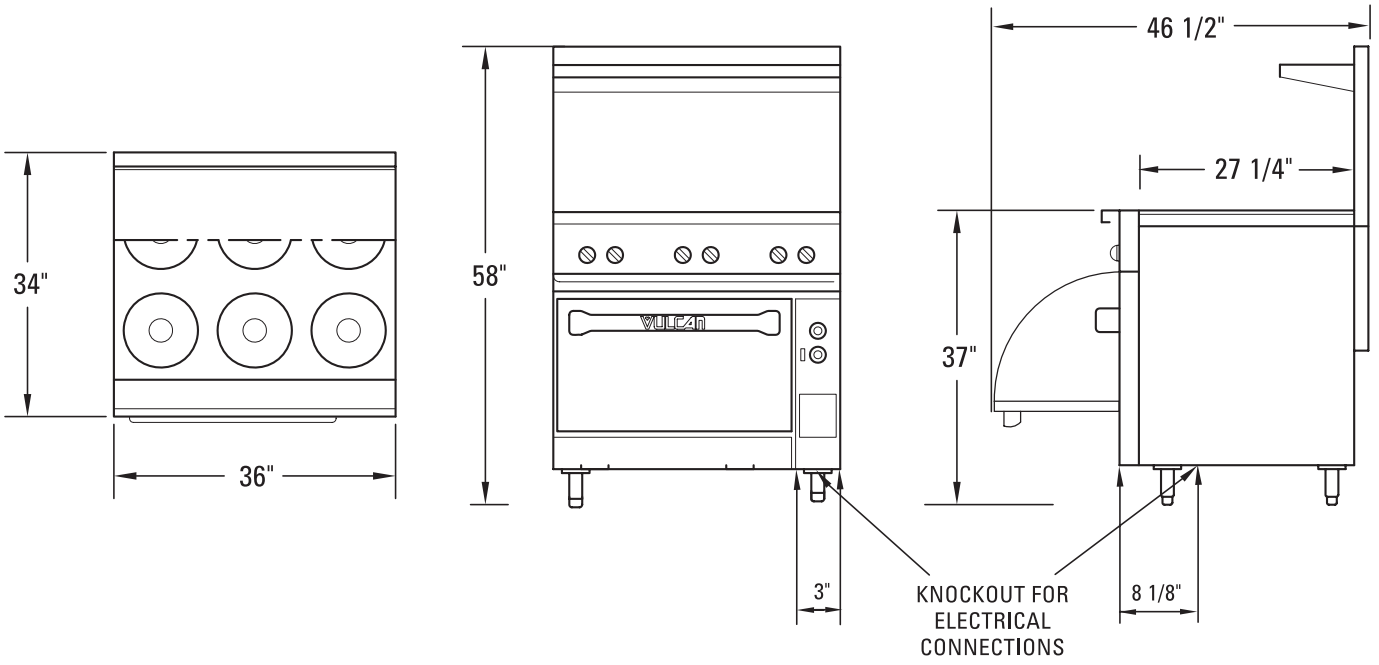
P.O. Box 696 ■ Louisville, KY 40201 ■ Toll-free: 1-800-814-2028 ■ Local: 502-778-2791 ■ Quote & Order Fax: 1-800-444-0602

36" ELECTRIC RESTAURANT RANGE
6 FRENCH PLATES

INSTALLATION INSTRUCTIONS

Clearances from Combustible Construction	Rear	Sides
Range with French Plates	0"	3"
Range with Griddle Tops	0"	3"
Range with Hot Tops	0"	6"

Ranges with an ESB Salamander Broiler mounted above: Refer to the ESB Salamander Broiler spec sheet for clearance specifications.



AVAILABLE VOLTAGES - 208, 240 OR 480 VOLT - 1 OR 3 PHASE									
3 PHASE LOADING						NOMINAL AMPS PER LINE WIRE			
MODEL NUMBER	VOLTAGE	TOTAL CONNECTING KW	KW PER PHASE			3 PHASE			1 PHASE
			X-Y	Y-Z	X-Z	X	Y	Z	
EV36S-6FP208	208	17.0	4.0	8.0	5.0	37.5	50.0	54.1	81.7
EV36S-6FP240	240	17.0	4.0	8.0	5.0	32.5	43.3	46.9	70.8
EV36S-6FP480	480	17.0	4.0	8.0	5.0	16.3	21.7	23.5	35.4

This appliance is manufactured for commercial use only and is not intended for home use.

VULCAN
a division of ITW Food Equipment Group LLC
P.O. Box 696 ■ Louisville, KY 40201 ■ Toll-free: 1-800-814-2028 ■ Local: 502-778-2791 ■ Quote & Order Fax: 1-800-444-0602

NOTE: In line with its policy to continually improve its products, Vulcan reserves the right to change materials and specifications without notice.

Printed On Recycled Paper

HOBART

Project _____

AIA # _____ SIS # _____

Item # #7 Quantity _____ C.S.I. Section 114000

COMMERCIAL DISHWASHERS

AM16T-BAS TALL BASE ELECTRIC

High Temperature Door-Style Dishwashing Machine



c UL us NSF ENERGY STAR

SPECIFIER STATEMENT

Specified unit will be a Hobart AM16 Tall Base electric high temperature dishwashing machine. Features include 3-sided pillarless hood, touchscreen controls with WiFi connectivity, NSF pot and pan rating for 2-, 4- & 6-minute cycles, 27" door opening, pumped drain, auto door start with auto fill, interchangeable stainless steel rinse arms and X-shaped wash arms, delime cycle, advanced diagnostics and service connection, up to 60 racks per hour, .67 U.S. gallons per rack pumped final rinse.

1 year parts and labor warranty.

STANDARD FEATURES

+ .67 gallons per rack pumped final rinse
+ 60 racks per hour – hot water sanitizing
+ User-friendly smart touchscreen controls
+ WiFi connectivity
+ SmartConnect app and cloud with machine status, temperature logs, error code reporting, and cost, consumption and usage analysis
+ Two stage filtration
+ Pillarless opening
+ 3-sided hood
+ Single point electrical connection standard, field convertible to dual point connection
+ 3 phase standard, field convertible to single phase
+ Temperature and chemical lock outs (with Hobart equipped chemical pumps)
+ Pumped drain
+ Timed wash cycles for 1, 2, 4 or 6 minutes
+ NSF pot and pan rating for 2-, 4- & 6- minute cycles
+ Sense-A-Temp™ 70°F rise electric booster heater
+ Self-draining, high efficiency wash pump with stainless steel impeller
+ 27" door opening for 18" x 26" sheet pans or 60-quart mixing bowl
+ Stainless steel drawn tank, tank shelf, chamber, trim panels, frame and feet
+ Spring counterbalanced chamber with UHMW guides
+ X-shaped revolving, interchangeable upper and lower anticlogging wash arms
+ Revolving, interchangeable upper and lower rinse arms
+ Slanted, self-locating, one-piece scrap screen and basket system
+ Automatic fill
+ Door actuated start
+ AutoClean
+ Vent fan control
+ Service diagnostics
+ Straight-through or corner installation
+ Delime cycle with notification (field activated)
+ Sheet pan rack

OPTIONS & ACCESSORIES (Available at extra cost)

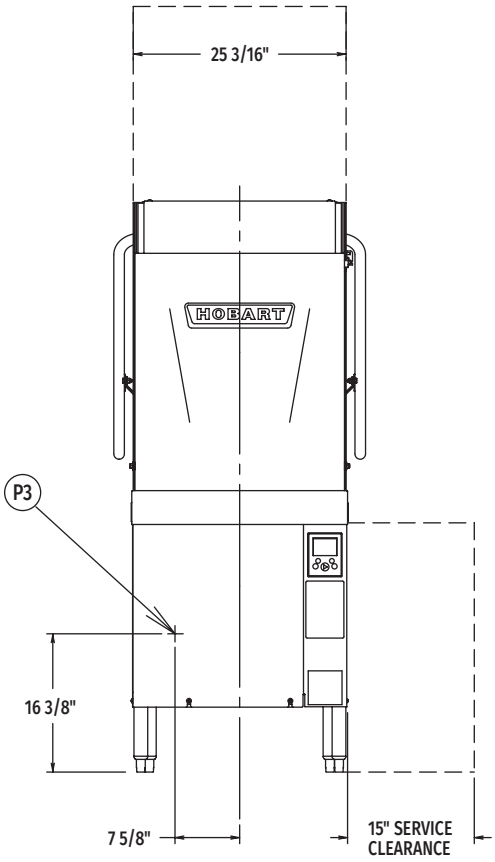
❑ Peg, combination and wine rack
❑ Chemical pumps
❑ Splash shield for corner installations
❑ Flanged and seismic feet
❑ Water hammer arrestor kit
❑ Rapid fill kit
❑ Sink integration kit
  + Sink saddle & 3" leg extension
  + Sink rail kit
  + Fold down table
❑ Drain water tempering kit
❑ Door lock kit
❑ Prison package
❑ Marine package
❑ Pumped drain air gap kit

AM16 SERIES – AM16T-BAS TALL BASE ELECTRIC

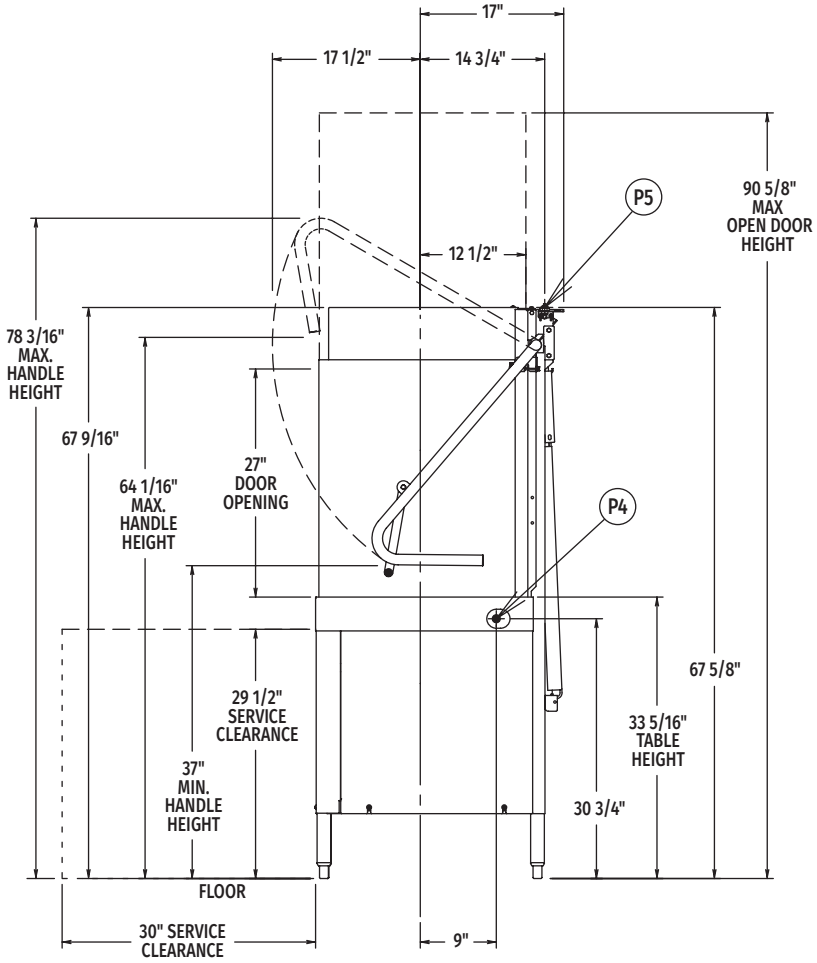
Approved by_____ Date_____ Approved by_____ Date_____

AM16T-BAS TALL BASE ELECTRIC

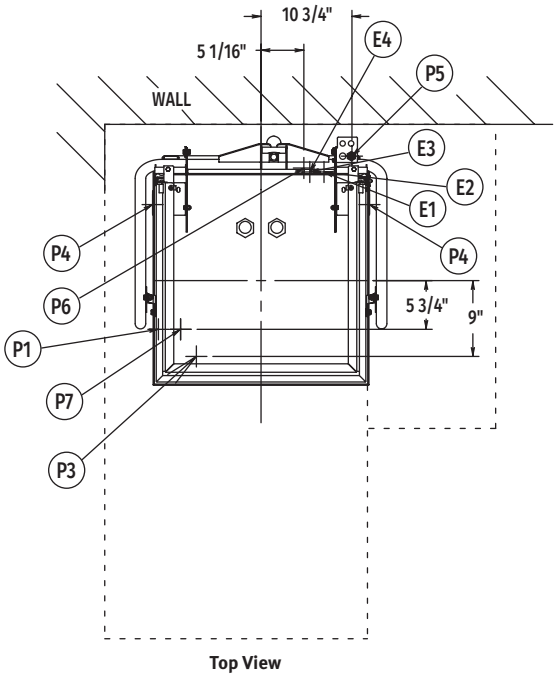
High Temperature
Door-Style Dishwashing Machine



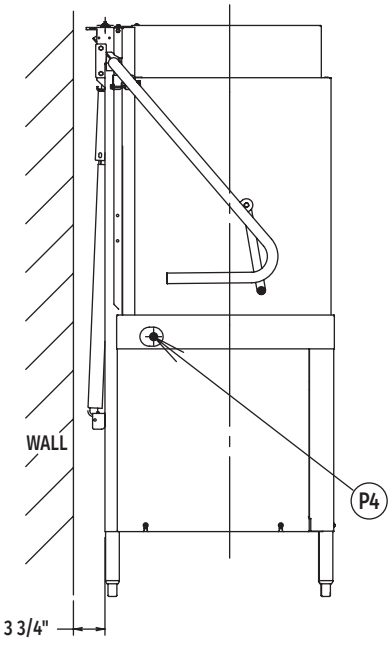
Front View



Right Side View



Top View



Left Side View

MODEL:
AM16T-BAS
E-950440

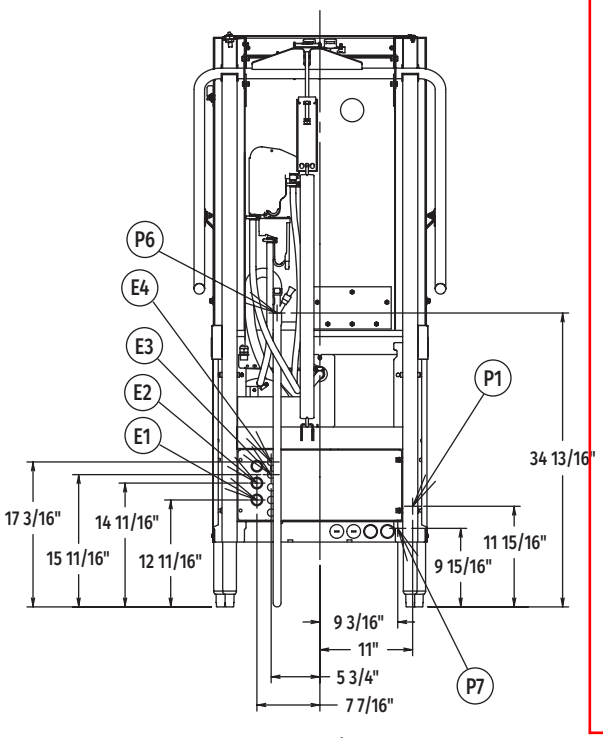
CAD and/or Revit Files Available

AM16T-BAS TALL BASE ELECTRIC

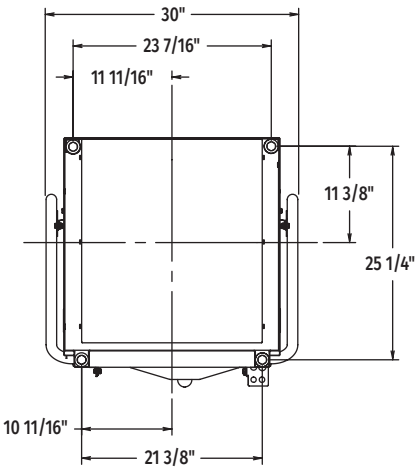
High Temperature
Door-Style Dishwashing Machine

WARNING: Electrical and grounding connections must comply with the applicable portion of the National Electrical Code and/or other local electrical codes.

Plumbing connections must comply with applicable sanitary, safety, and plumbing codes.



Rear View



Bottom View

Miscellaneous Note: For optimal performance, Hobart recommends maintaining a dishroom temperature of 65°F (18°C) or higher, as lower temperatures may hinder the machine's capacity to operate effectively (with lower performance as ambient temperature decreases).

LEGEND

Electrical Connections	
E1	Electrical connection: wash pump motor & sump heater, 1" or 3/4" conduit hole; 12-11/16" AFF.
E2	Electrical connection: electric booster & controls only or single point electrical connection (3PH only) 1" or 3/4" conduit hole; 14-11/16" AFF.
E3	Electrical connection: detergent & rinse agent feeders, (DPS1 & DPS2) 1.5 amps @ nameplate supply voltage, (RPS1 & RPS2) 1.5 amps @ nameplate supply voltage; 1/2" conduit hole, 15-11/16" AFF.
E4	Electrical connection: vent fan control (VFC1 & VFC2) switching circuit only 1.5 amps @ nameplate supply voltage; 1/2" conduit hole, 17-3/16" AFF.
Plumbing Connections	
P1	Common water connection including booster heater: 110°F water minimum, 15-65 PSI recommended; 3/4" female garden hose fitting on 6' long hose supplied with machine; 11-15/16" AFF.
P3	Detergent probe sensor: remove cap and stud assembly to access 7/8" hole; 16-3/8" AFF.
P4	Detergent feeder: two locations available. Remove cap and stud assembly to access 7/8" hole; 30-3/4" AFF.
P5	Rinse agent feeder: remove 1/8" NPT pipe plug to access 1/8" NPT tapped hole; 67-5/8" AFF.
P6	Drain connection: 5/8" barb fitting with 6' long hose supplied with machine; 34-13/16" AFF. Maximum height 40" AFF.
P7	Optional – cold water connection: 55°F water minimum (drain water tempering - when ordered); 3/4" female garden hose fitting on 8' long hose; 9-5/16" AFF.

SPECIFICATIONS

Capacities
- Racks Per Hour (maximum) 60
- Dishes per Hour (average 25 per rack) 1,500
- Glasses per Hour (average 45 per rack) 2,700
- Wash Tank (U.S. gallons) 10.5

Motor Horsepower
- Rinse Pump 0.18
- Wash Pump 2
- Drain Pump 0.21

Rinse
- Gallons per Rack 0.67
- Gallons per Hour (maximum consumption) 40.2

Peak Rate of Drain Flow
- Gallons per Minute (initial rate with full tank) 18.5

Heating
- Electric Booster (kW) 7.1
- Electric Heating Unit (kW) 5.4

Exhaust Requirements . . . . . 450 CFM

Shipping Weight (approximate) . . . . . 357 lbs.

Crated Dimensions . . . . . 73.75"H x 36.5"W x 36.5"L

As continued product improvement is a policy of Hobart, specifications are subject to change without notice.

AM16T-BAS TALL BASE ELECTRIC

High Temperature Door-Style Dishwashing Machine

E1	AM16 with Electric Heat (When Field Converted to Dual Point)		
Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Protective Device
208-240/60/1	39.6	50	50
208-240/60/3	26.9	30	30
480/60/3	10.5	15	15
200-240/50/3*	22.1	30	30
380-415/50/3*	11.8	20	20

E2	Electric Booster & Controls (When Field Converted to Dual Point)		
Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Protective Device
208-240/60/1	42.3	50	50
208-240/60/3	25.6	30	30
480/60/3	12.9	15	15
200-240/50/3*	25.6	30	30
380-415/50/3*	14.7	20	20

*These electrical specifications are not submitted for UL or CUL listing

E2	AM16 Single Point Electrical Service Connection as Shown Below		
Voltage	Rated Amps	Minimum Supply Circuit Ampacity	Maximum Protective Device
208-240/60/3	52.5	60	60
~~480/60/3~~	~~23.5~~	~~30~~	~~30~~
200-240/50/3*	47.7	60	60
380-415/50/3*	26.5	30	30

*These electrical specifications are not submitted for UL or CUL listing

Miscellaneous Notes: All dimensions taken from floor line may increase 7/8" or decrease 3/8" depending on leg adjustment.

Vent hood (if required) to provide a minimum 450 CFM exhaust (ref installation instructions).

Net weight of machine including booster: 340 lbs.
Domestic shipping weight including booster: 360 lbs.

Size of racks – 19-3/4" x 19-3/4".

Approximate Heat Gain to Space without Vent Hood	
Type	BTU/Hr.
Latent	12,300
Sensible	5,700

Plumbing Notes: Water hammer arrestor (meeting ASSE-1010 standard or equivalent) to be supplied (by others) in common water supply line at service connection.

Recommended water hardness to be 3 grains or less for best results.

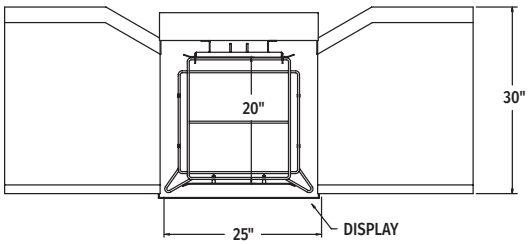
Note: Electric heating unit & booster (kW) calculated at 208V.

Recommended building flowing water pressure to the dishwasher at or above 20 PSI. Pressures lower than 20 PSI may affect machine fill/start-up times.

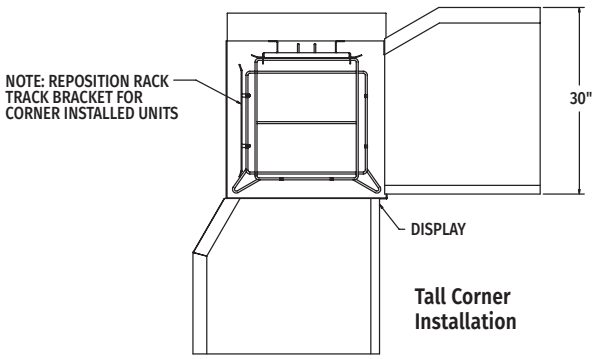
This is a pumped rinse machine. Pressure regulating valve is not necessary on hot or cold lines.

For convenience when cleaning, water tap should be installed near machine with heavy duty hose and squeeze valve.

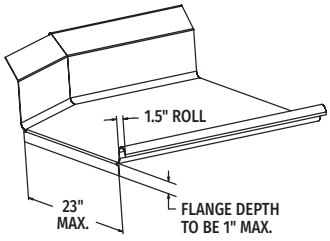
AM16T-BAS TABLING CONFIGURATIONS AND TRACK DESIGN



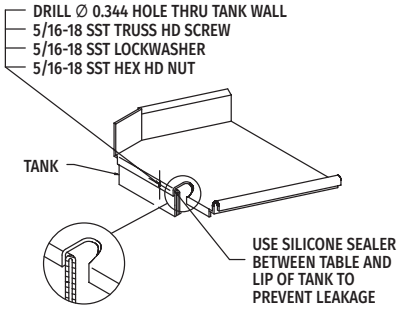
Pass Thru Installation



Tall Corner Installation



Suggested Table Design



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STAINLESS STEEL

DISHTABLES
CLEAN STRAIGHT

NEW *Tile Edge Design* NSF

Item #: #8 Qty #: _____
Model #: _____
Project #: _____



DTC-S60-60R Shown
Optional Undershelf Shown

Spec-Line: 14 ga. 304 Series Stainless Steel Top.
16 ga. 304 Stainless Steel Legs Stainless Steel Legs with Welded Cross Bracing & Stainless Steel Bullet Feet.

UPGRADED!
Standard: 16 ga. 304 Series Stainless Steel Top.
16 ga. 304 Stainless Steel Legs Stainless Steel Legs with Welded Cross Bracing & Stainless Steel Bullet Feet.

Super Saver: 16 ga. 304 Series Stainless Steel Top.
Galvanized Legs with Plastic Bullet Feet.

FEATURES:

Tile edge for ease of installation.
Dishtable system consists of SOIL and CLEAN sections.
Table is furnished with 10-1/2" splash with a 2" return.

CONSTRUCTION:

All TIG welded.
Welded areas blended to match adjacent surfaces and to a satin finish.
Stainless Steel Gussets welded to a stainless steel support channel.

Optional Stainless Steel UNDERSHELF Die Cast LEG CLAMP
secured to shelf eliminates unsightly nuts & bolts



10-1/2"" EXTRA LARGE Bold Looking Backsplash with 2" return and tile edge



ACCESSORIES	Model #	Qty
Faucet		
Wall Shelf		
Undershelf		

Nominal sizing on all dishtables for ease of installation.

		14 Gauge 304 16 Ga. Stainless Steel Legs	16 Gauge 304 Stainless Steel Legs	16 Gauge 304 Galvanized Legs	
Nominal Size	"L"	SPEC-LINE	STANDARD	SUPER SAVER	Approx. Wt.
2 Ft.	23"	DTC-S30-24L or R	DTC-S70-24L or R	DTC-S60-24L or R	35 lbs.
3 Ft.	35"	DTC-S30-36L or R	DTC-S70-36L or R	DTC-S60-36L or R	45 lbs.
4 Ft.	47"	DTC-S30-48L or R	DTC-S70-48L or R	DTC-S60-48L or R	60 lbs.
5 Ft.	59"	DTC-S30-60L or R	DTC-S70-60L or R	DTC-S60-60L or R	70 lbs.
6 Ft.	71"	DTC-S30-72L or R	DTC-S70-72L or R	DTC-S60-72L or R	85 lbs.
7 Ft.	83"	DTC-S30-84L or R	DTC-S70-84L or R	DTC-S60-84L or R	100 lbs.
8 Ft.	95"	DTC-S30-96L or R	DTC-S70-96L or R	DTC-S60-96L or R	110 lbs.
9 FT.	107"	DTC-S30-108L or R	DTC-S70-108L or R	DTC-S60-108L or R	225 lbs.
10 Ft.	119"	DTC-S30-120L or R	DTC-S70-120L or R	DTC-S60-120L or R	250 lbs.
12 Ft.	143"	DTC-S30-144L or R	DTC-S70-144L or R	DTC-S60-144L or R	260 lbs.

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Email: smartfab@advancetabco.com or **Fax:** 631-586-2933

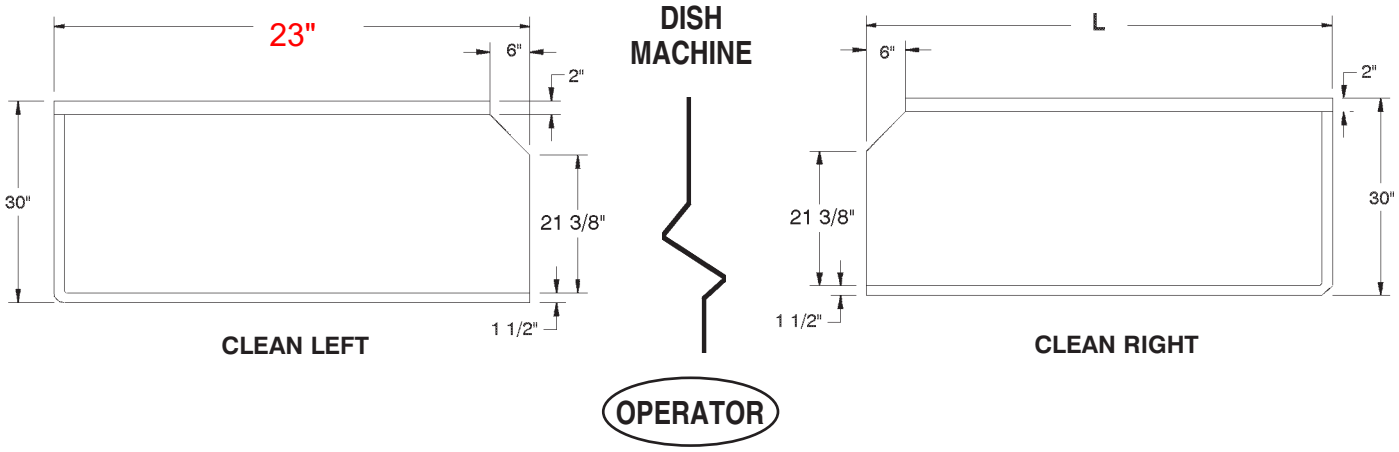
DIMENSIONS and SPECIFICATIONS

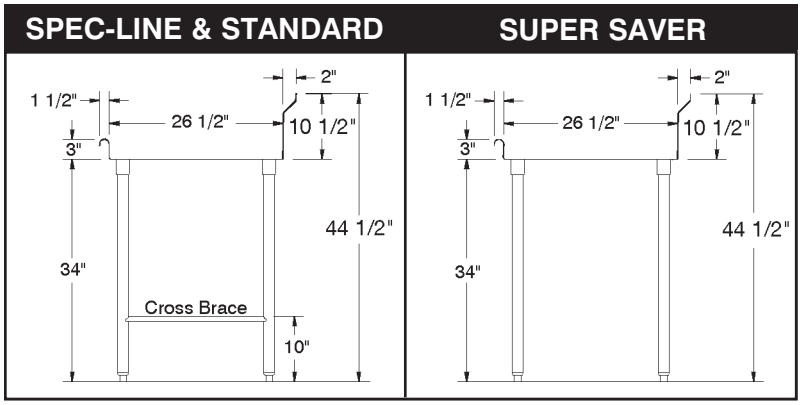
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ALL DIMENSIONS ARE TYPICAL

SEE DISH MACHINE COMPATIBILITY CHART TO ENSURE PROPER FIT

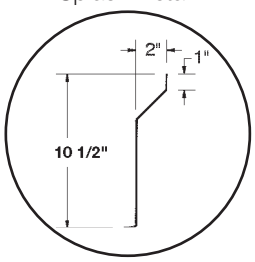
Dish Machine Compatibility Chart can be found on our website at www.advancetabco.com under “Product Support”





CUSTOMIZE YOUR OWN SYSTEM
by Ordering Optional Accessories from our
PRODUCT & PRICE GUIDE

Splash Detail



Description	SPEC-LINE	STANDARD	SUPER SAVER
Material	**14 Ga. 304 Series**	**16 Ga. 304 Series**	**16 Ga. 304 Series**
1 5/8” Dia. Legs	Stainless Steel	Stainless Steel	Galvanized
Gussets	Stainless Steel	Stainless Steel	Stainless Steel
Bullet Feet (1” adj.)	Stainless Steel	Stainless Steel	Plastic
Cross Bracing	Welded	Welded	Optional

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STAINLESS STEEL

DISHTABLES
CLEAN STRAIGHT

NEW *Tile Edge Design* NSF

Item #: #9 Qty #: _____
Model #: _____
Project #: _____



DTC-S60-60R Shown
Optional Undershelf Shown

Spec-Line: 14 ga. 304 Series Stainless Steel Top.
16 ga. 304 Stainless Steel Legs Stainless Steel Legs with Welded Cross Bracing & Stainless Steel Bullet Feet.

UPGRADED!
Standard: 16 ga. 304 Series Stainless Steel Top.
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FEATURES:

Tile edge for ease of installation.
Dishtable system consists of SOIL and CLEAN sections.
Table is furnished with 10-1/2" splash with a 2" return.

CONSTRUCTION:

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Welded areas blended to match adjacent surfaces and to a satin finish.
Stainless Steel Gussets welded to a stainless steel support channel.

Optional Stainless Steel UNDERSHELF Die Cast LEG CLAMP
secured to shelf eliminates unsightly nuts & bolts



10-1/2"" EXTRA LARGE Bold Looking Backsplash with 2" return and tile edge



ACCESSORIES	Model #	Qty
Faucet		
Wall Shelf		
Undershelf		

Nominal sizing on all dishtables for ease of installation.

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5 Ft.	59"	DTC-S30-60L or R	DTC-S70-60L or R	DTC-S60-60L or R	70 lbs.
6 Ft.	71"	DTC-S30-72L or R	DTC-S70-72L or R	DTC-S60-72L or R	85 lbs.
7 Ft.	83"	DTC-S30-84L or R	DTC-S70-84L or R	DTC-S60-84L or R	100 lbs.
8 Ft.	95"	DTC-S30-96L or R	DTC-S70-96L or R	DTC-S60-96L or R	110 lbs.
9 FT.	107"	DTC-S30-108L or R	DTC-S70-108L or R	DTC-S60-108L or R	225 lbs.
10 Ft.	119"	DTC-S30-120L or R	DTC-S70-120L or R	DTC-S60-120L or R	250 lbs.
12 Ft.	143"	DTC-S30-144L or R	DTC-S70-144L or R	DTC-S60-144L or R	260 lbs.

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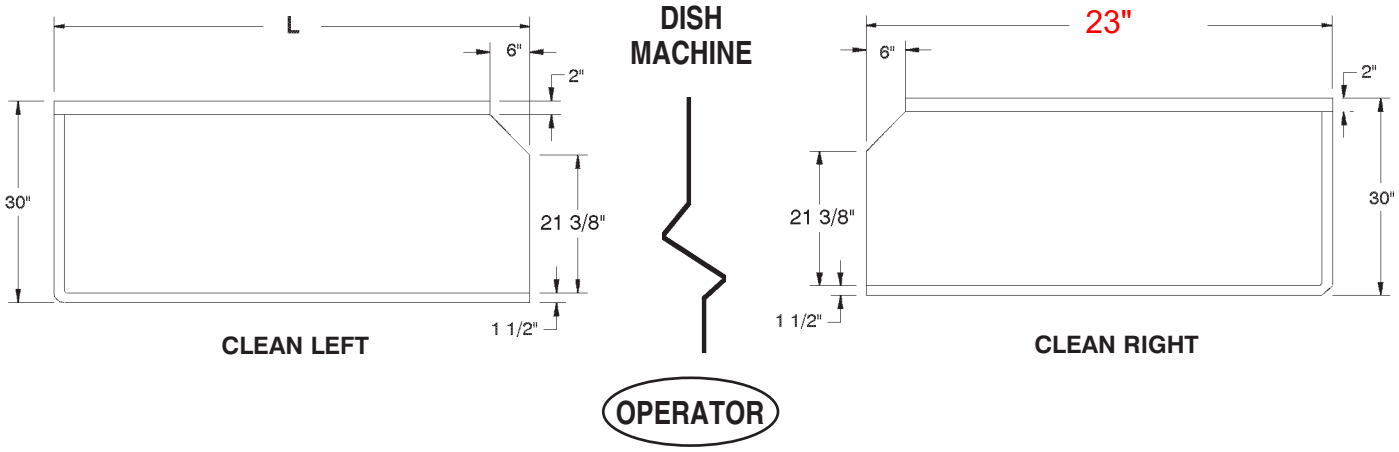
DIMENSIONS and SPECIFICATIONS

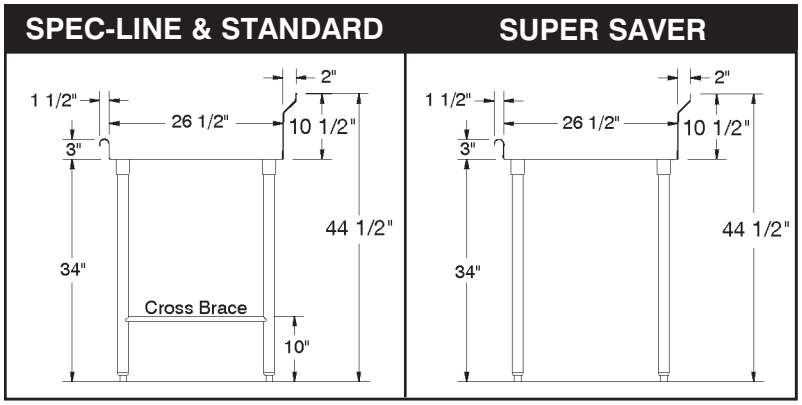
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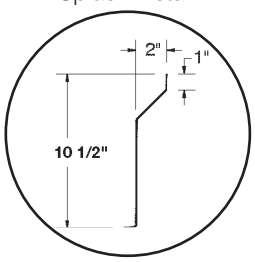
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by Ordering Optional Accessories from our
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Splash Detail



Description	SPEC-LINE	STANDARD	SUPER SAVER
Material	**14 Ga. 304 Series**	**16 Ga. 304 Series**	**16 Ga. 304 Series**
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Gussets	Stainless Steel	Stainless Steel	Stainless Steel
Bullet Feet (1” adj.)	Stainless Steel	Stainless Steel	Plastic
Cross Bracing	Welded	Welded	Optional

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SECTION 116800 -EXERCISE EQUIPMENT AND STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes all playground equipment.

1.2 REFERENCES

A. ASTM F3101 – Standard Consumer Safety Performance Specification for unsupervised public-use outdoor fitness equipment

B. Consumer Product Safety Council (CPSC) Handbook for Public Playground Safety.

1.3 QUALITY ASSURANCE

A. Certification

1. Certifications for UV stability, material handling to include physical and chemical properties and stability and reactivity.

B. Other

1. Installer’s Qualifications: Must be a certified equipment installer with not less than five years’ experience in the assembly and installation of exercise equipment of the type proposed for the work or supervised in the field by a representative of the manufacturer.
2. Drawings: complete shop drawings, including installation details, dimensions, interface, or attachment to adjacent work, fastening and anchoring methods of all system components, detail and location of joints, and notation or identification of finishes for work specified herein.
3. The Contractor shall notify Owner's Representative of any discrepancies of site dimensions, obstructions, etc. that are not shown in the drawings and that might not have been known during preparation of drawings. If such notification is not made, Contractor shall assume all expenses and responsibility for any revisions necessary. Work called for on the drawings by notes or on details shall be furnished and installed whether specifically mentioned in the specifications.

1.4 GUARANTEE

A. Warranty

1. During the period of ten (10) full years after the final payment of work, make all necessary repairs or replacements due to defective workmanship or materials within thirty (30) calendar days of receipt of notice of malfunction by the Owner.

1.5 ACTION SUBMITTALS

A. Product Data: For each piece of equipment, including color and texture, proposed.

B. Shop Drawings: For overall playground layout and each proposed piece of equipment.

1. Include plans, elevations, sections, and attachment details.
2. Include fall heights and use zones for playground equipment.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturers

1. Action Fit, 1675 Locust St. Red Bud, IL 62278.
   Phone: (800) 458-5872. Website www.actionfitoutdoors.com
2. Kompan, 605 West Howard Lane, Suite 101. Austin, TX 78753.
   Phone: (800) 426-9788 Website: www.kompan.com
3. WillyGoat, p.o. box 59278, Birmingham, AL 35259
   Phone: (888) 920-4628 Website: www.willygoat.com

2.2 EXERCISE EQUIPMENT

A. Cardio Walker.
   1. Acceptable Materials:
      a. Heavy Duty Steel (frame)
      b. Rust Resistant Coating
      c. Vandal Resistant design
      d. Surface Mount Covers
   2. Acceptable Colors:
      a. Silver Metallic
      b. Black (Secondary color)

B. Double Sit-up Station.
   1. Acceptable Materials:
      a. Heavy Duty Steel (frame)
      b. Rust Resistant Coating
      c. Vandal Resistant Design
   2. Acceptable Colors:
      a. Silver Metallic
      b. Black (secondary color)

C. Pull Up and Dip Station
   1. Acceptable Materials:
      a. Heavy Duty Steel (frame)
      b. Rust Resistant Coating
      c. Vandal Resistant Design

2. Acceptable Colors:
    a. Silver Metallic
    b. Black (secondary color)

2.3 MATERIALS

A. All materials shall be structurally sound and suitable for safe play. Durability shall be ensured on all steel parts using time-tested coatings such as zinc plating, galvanizing, powder coating, etc.

B. Fasteners: Primary fasteners shall be socketed and pinned tamperproof in design, stainless steel (SST) per ASTM F 879 unless otherwise indicated. All primary fasteners shall include a locking patch type material that will meet minimum torque requirements of IFI-125. Manufacturer to provide special tools for pinned tamperproof fasteners.

C. Powder Coating: Metal components to be powder coated shall be thoroughly cleaned in a hot phosphatizing wash system, then primed with a water-based thermosetting solution. Primed parts shall be preheated prior to dipping in UV stabilized, liquid polyvinyl chloride (PVC), then salt cured at approximately 400 degrees. The finished coating shall be approximately 0.08” thick at an 85 durometer with a minimum tensile strength of 1700 psi and a minimum tear strength of 250 pounds per inch.

D. Hot Dipped Galvanized (HDG) Steel: Steel components to be Hot Dipped Galvanized shall be thoroughly cleaned of organic compounds and dirt through complete immersion in a hot alkali solution. Cleaned parts shall undergo acid pickling to remove rust or scale. All parts shall then be fluxed to eliminate surface oxides and promote intermetallic development. Prepped parts shall then be submerged in a bath of molten zinc until the part reaches 840° F and the zinc reacts to form zinc/iron intermetallic layers on all surfaces inside and out. Hot Dipped Galvanized Parts shall be manufactured and inspected according to ASTM A123.

E. Decks: All decks shall be of modular design and have 5/16" diameter holes on the standing surface. There shall be a minimum of (4) slots in each face to accommodate face mounting of components. Decks shall be manufactured from a single piece of low carbon 12 GA (.105") sheet steel conforming to ASTM specification A-1011. The sheet shall be perforated with a return flange on the perimeter to provide the reinforcement necessary to ensure structural integrity. There shall be no unsupported area larger than 3.5 square feet. Decks shall be designed so that all sides are flush with the outside edge of the supporting posts.

F. Rotationally Molded Polyethylene Parts: These parts shall be molded using prime natural linear low-density polyethylene having a tensile strength of 2400 psi per ASTM D638. Rotational molding resin is compounded with color and UV-stabilizing additives with a nominal wall thickness typically 1/4" with some variation depending upon product type.

G. Recycled Plastic Panels: These parts shall be manufactured from 3/4" high-density polyethylene that has been specially formulated for optimum UV stability and color retention. Products shall meet or exceed density of .960 G/cc per ASTM D1505, tensile strength of 2400 PSI per ASTM D638. Available in a three-layer product with (2) .100" thick colored exterior layers over a .550" thick recycled Black interior core.

H. Footings: Unless otherwise specified, the bury on all footings shall be 34” below finished grade on all in-ground play elements and posts.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations indicated in shop drawings.

1. Comply with manufacturer’s instructions for size and structural requirements of playground equipment footings.

2. Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.

3.2 FIELD QUALITY CONTROL

A. Testing Agency: Contractor to engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Perform testing and inspection for each type of installed playground equipment according to ASTM F 1487.

C. Playground equipment items will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 116800

SECTION 12 24 00
WINDOW TREATMENT - ROLLER SHADES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manual roller shades and accessories.

B. Motorized roller shades and accessories.

C. Motor controls, interfaces, and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

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

B. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems; Current Edition, Including All Revisions.

C. WCMA A100.1 - Safety of Window Covering Products; 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

B. Preinstallation Meeting: Convene 2 weeks prior to commencing work related to products of this section; require attendance of all affected parties.

C. Sequencing:
   1. Do not fabricate shades until field dimensions for each opening have been taken with finished conditions in place. "Hold to" dimensions are not acceptable.
   2. Do not install shades until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product to be used including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
   1. Motorized Shades: Include power requirements and standard wiring diagrams solely for the specified products.

C. Shop Drawings: Include shade schedule indicating size, location and keys to details.
   1. Motorized Shades: Include one-line diagrams, wire counts, coverage patterns, and physical dimensions of each item. Include location plan showing all switch and control zones, switches, sensors and other control accessories.

D. Source Quality Control Submittals: Provide test reports indicating compliance with specified fabric properties.

E. Selection Samples: Include fabric samples in full range of available colors and patterns.

F. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

G. Project Record Documents: Record actual locations of control system components and show interconnecting wiring.

H. Operation and Maintenance Data: List of all components with part numbers, and operation and maintenance instructions; include copy of shop drawings.

I. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Motorized Shades: Comply with NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

C. Installer Qualifications: Company specializing in performing work of this type with minimum ten years of documented experience with shading systems of similar size, type, and complexity; manufacturer's authorized representative.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.

B. Handle and store shades in accordance with manufacturer's recommendations.

1.08 FIELD CONDITIONS

A. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.09 WARRANTY

A. See Section 013300, for additional warranty requirements.

B. Provide manufacturer's standard, non-depreciating warranty, for interior shading only, covering the following:
   1. Shade Hardware:
      a. Mecho /5 with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years from the Date of Substantial Completion.
      b. ElectroShade with ThermoVeil, EuroVeil, EuroTwill, Soho, Equinox, Midnite, Chelsea, or Classic Blackout shade fabric: 25 years from the Date of Substantial Completion.
   2. Shade Fabric: 10 years from the Date of Substantial Completion.
   3. Electric Motors, Controls, and Accessories: Five years from the Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: MechoShade Systems LLC: www.mechoshade.com/#sle.

B. Other Acceptable Manufacturers:
   1. SWF Contract.
   2. Draper.
   3. Products by listed manufacturers are subject to compliance with specified requirements.

2.02 WINDOW TREATMENTS

A. ROLLER SHADES, designated in the Drawings as FinishType WT-#.
   1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information.

B. General:
   1. Provide shade system components that are capable of being removed or adjusted without removing mounted shade brackets or cassette support channel.
   2. Provide shade system that operates smoothly when shades are raised or lowered.
   3. Electrical Components: Listed, classified, and labeled as suitable for the purpose intended. Individual testing of components will not be acceptable in lieu of system testing. Where applicable, system components to be FCC compliant.

C. Roller Shades Type WT-1: MechoShade; Mecho/5 System.
   1. Description: Single roller, manually operated fabric window shades.

a. Drop Position: Regular roll.
b. Mounting: Window jamb mounted.
c. Size: As indicated on drawings.
d. Fabric: As indicated under Shade Fabric article.

2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   a. Material: Steel, 1/8 inch thick.
3. Roller Tubes:
   a. Material: Extruded aluminum.
   b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
   c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
   d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
   a. Provide a permanently lubricated brake assembly mounted on a oil-impregnated hub with wrapped spring clutch.
   b. Brake must withstand minimum pull force of 50 pounds in the stopped position.
   c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound minimum breaking strength. Provide upper and lower limit stops.
   a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
7. Managed Lift: Required lifting force of 3 pounds to a maximum of 8.5 pounds for single band or multi-band shades up to 5 bands and a maximum of 30 pounds hanging weight.
8. Accessories:
   a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
      1) Fascia to be capable of installation across two or more shade bands in one piece.
      2) Color: Black.
      3) Profile: Square.
      4) Configuration: Captured, fascia stops at captured bracket end.

D. Roller Shades: Type WT-2: MechoShade; ElectroShade with iQ2-AC EDU, line voltage, 120 VAC.
   1. Description: Single roller, motor operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
      a. Drop Position: Regular roll.
      b. Mounting: Window jamb mounted.
      c. Size: As indicated on drawings.
      d. Fabric: As indicated under Shade Fabric article.
   2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
      a. Material: Steel, 1/8 inch thick.
   3. Roller Tubes:
      a. Material: Extruded aluminum.
      b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.

c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.

4. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
5. Accessories:

E. Roller Shades: Type WT-3: MechoShade; UrbanShade Double Roller - Manual.
1. Description: Double roller, manually operated fabric window shade system complete with mounting brackets, roller tubes, hembars, hardware, and accessories.
   a. Drop Position: Regular roll.
   b. Mounting: Window jamb mounted.
   c. Size: As indicated on drawings.
   d. Fabric: As indicated under Shade Fabric article.
2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
   a. Material: Stamped steel.
   b. Double Roller Brackets: Configured for light-filtering and room-darkening shades in one opening.
      1) Light-Filtering Fabric: Room-side of opening.
      2) Room-Darkening Fabric: Glass-side of opening.
3. Hembars: Designed to maintain bottom of shade straight and flat.
   a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
4. Manual Operation:
   a. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
      1) Provide brake assembly mounted on a low-friction plastic hub with wrapped spring clutch.
      2) Brake must withstand minimum pull force of 25 pounds in the stopped position.
      3) Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
   b. Drive Chain: Continuous loop beaded ball chain. Provide upper and lower limit stops.
      1) Chain must withstand a breaking force of no less than 45 pound-force.
      2) Chain Retainer: Chain tensioning device complying with WCMA A100.1.
   c. Lift Assist Mechanism: Provide manufacturer's standard device, contained in the idler end of roller tube, when hanging weights exceed roller tube weight limits.
5. Accessories:
   a. Fascia: Removable extruded aluminum fascia, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; baked enamel finish.
      1) Fascia to be capable of installation across two or more shade bands in one piece.
      2) Color: Black.
      3) Profile: Square.
      4) Configuration: Captured, fascia stops at captured bracket end.
   b. Room-Darkening Channels, Standard: Extruded aluminum side and center channels with brush pile edge seals, SnapLoc mounting base, and concealed fasteners. Channels to accept one-piece exposed blackout hembar to assure side light control and sill light control.

2.03 SHADE FABRIC

A. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
1. Material Composition:
   a. PVC coated polyester yarns.

2. Fabric Products:
    a. Type WT-1, WT-2 and WT-3 (inboard): MechoShade; Soho - 1100 Series (1% open).
    b. Type WT-3 (outboard): MechoShade; Blackout - Chelsea 0250 Series (opaque).

2.04 INTELLIGENT ENCODED ELECTRONIC DRIVE SYSTEM

A. Electronic Drive Unit (EDU) System - General Requirements:
    1. Provide system listed as complying with UL 325. Recognized component certification is not acceptable in lieu of system testing. Provide listing label and motor rating readily visible for inspection without requiring dismounting of shade assembly for motor or removal of EDU from shade roller tube.
    2. Size and Configuration: As recommended by manufacturer for type, size, and arrangement of shades to be operated.
    3. Conceal EDU inside shade roller tube.
    4. Use EDUs rated at same nominal speed for shades in same room.
    5. Total hanging weight of shade band not to exceed 80 percent of rated lifting capacity of shade EDU and tube assembly.
    6. Capable of upgrading firmware from anywhere on network without touching motor.

B. Line-Voltage EDU, 120 VAC:
    1. Basis of Design: MechoShade Systems LLC; IQ2-AC.
    2. Description: Tubular, asynchronous, with integral AC motor and reversible capacitor operating at 120 VAC, single phase, 60 Hz; temperature Class B, thermally protected, totally enclosed, maintenance-free; powered by line-voltage power supply connection equipped with locking disconnect plug assembly furnished with EDU.
    3. Audible Noise: 46 dBA or less measured 3 feet from motor unit, depending on motor torque.
    4. Nominal Speed: Minimum of 34 rpm; does not vary due to load/lift capacity.
    5. Provide isolated, low-voltage power supply for powering external accessories connected to either dry contact port or network port. Products that require accessories to be powered by plug-in or externally supplied power supply are not acceptable.

C. Modes of Operation:
    1. Uniform Mode: Move shades only to defined intermediate stop positions to maintain aesthetic uniformity.
    2. Normal Mode: Move shades to defined intermediate stop positions plus any position between defined upper and lower limits.
    3. Maintenance Mode: Prevent shade from moving to newly commanded positions via dry contact or network control commands until EDU has been serviced or Maintenance Mode has been cleared or disabled.

D. Control Methods:
    1. Local Isolated Dry Contact Inputs:
        a. Support local switch control and third-party system integration without separate interface.
        b. Support moving EDU and associated shade to upper and lower limits and to local switch preset positions.
        c. Support configuration of upper and lower limits, custom presets, and key modes of operation without requiring PC or similar microprocessor-based tools.
        d. Support configuration under protected sequences to prevent changes by unauthorized user.
        e. Dry Contact Ports:
            1) Assign dry contact port dedicated local switch address which can be matched by other EDUs within their eight network addresses to support group control over serial network when dry contact commands are received. The EDU receiving dry contact commands may or may not be configured to operate based on commands coming through integral dry contact input port.

2) EDU receiving dry contact commands may or may not be configured to operate based on commands coming through its own dry contact input port.

f. Switch Personalities: Support configuration of dry contact control port over network such that dry contact keypad or third-party interface with maintained or momentary actuation methodology can be used to operate shade. Dry contact control connections include:

1) One-button.
   (a) Support garage-door-style, sequential shade movements of up, down, and stop from single button.
   (b) Configurable to also work with up to three presets.
2) Two-button.
   (a) Support movements up and down through two buttons configurable to support maintained or momentary button press styles of operation.
   (b) Button press while shade is moving registers as stop command.
3) Three-button capable of supporting switches with three to five buttons.
   (a) Support movements up and down configurable to support maintained or momentary button press styles of operation.
   (b) Button press while shade is moving registers as stop command.
   (c) Support momentary button press to up to three intermediate presets.
   (d) Support configuration of limits, presets, and key operating modes through protected sequences to prevent changes by unauthorized user.
4) Three-button with no configuration capability to prevent accidental changes in settings by users.

2. Serial Network Control:
   a. Support bidirectional network communication to enable commanding operation of large groups of shades over common backbone.
   b. Each EDU to support eight network addresses capable of being employed for various levels of group control.
   c. Provide each EDU with independent unique identifier address (UID) to enable EDU to be independently controlled and configured over network via handheld configurator or PC controller.
   d. Network Communication Card: Integral with tubular EDU assembly.
   e. Support configuration of upper and lower limits using handheld removable program configurator, computer and software tool, app running on smart mobile device, or local switch.
   f. Support configuration of addresses using handheld removable program configurator, computer and software tool, or app running on smart mobile device.

E. Alignment Positions:
   1. Support positioning commands from 0 to 100 percent in 1 percent increments and 32 customizable presets, including three intermediate dry contact presets resulting in repeatable and precisely aligned shade positions and limits.
   2. Shades on same switch circuit or with same network group address with same opening height align at each intermediate stopping position when traveling from any position, up or down.
   3. Shades of differing heights capable of custom, aligned intermediate stop positions when traveling from any position, up or down.
   4. Alignment of standard shade bands mechanically aligned on same EDU not to exceed plus/minus 0.125 inch when commanded to same alignment position.
   5. Alignment of standard shades on adjacent EDU's not to exceed plus/minus 0.25 inch when commanded to same alignment position.

F. Local Switch Presets:
   1. Provide minimum of three customizable preset positions accessible over local dry contact control inputs and over network connection.

2. Preset positions customizable to any position between and including defined upper and lower limits, initially defaulting to 25, 50, and 75 percent of shade travel.
3. Support configuration of custom preset positions using handheld removable program configurator, or local switch.

G. Network Presets:
1. Provide minimum of 32 customizable preset positions, including three local switch presets, accessible via network commands.
2. Preset positions customizable to any position between and including defined upper and lower limits, initially defaulting to defined lower limit.
3. Support configuration of custom preset positions using handheld removable program configurator.

2.05 MOTOR CONTROLS

A. Unless specifically indicated to be excluded, provide required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, and system programming necessary for complete operating system that provides control intent indicated.

B. Provide components and connections necessary to interface with other systems as indicated.

2.06 FABRICATION

A. Field measure finished openings prior to ordering or fabrication.

B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.
2. Horizontal Dimensions - Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 3/4 inch total.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine finished openings for deficiencies that may preclude satisfactory installation.

B. Start of installation shall be considered acceptance of substrates.

3.02 PREPARATION

A. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.

B. Coordinate with window installation and placement of concealed blocking to support shades.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.

B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

3.04 SYSTEM STARTUP

A. Motorized Shade System: Provide services of a manufacturer's authorized representative to perform system startup.

3.05 CLEANING

A. Clean soiled shades and exposed components as recommended by manufacturer.

B. Replace shades that cannot be cleaned to "like new" condition.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 79 00 - Demonstration and Training, for additional requirements.

3.07 PROTECTION

A. Protect installed products from subsequent construction operations.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 24 00

SECTION 12 32 16
MANUFACTURED PLASTIC LAMINATE FACED CASEWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract (including General Conditions, Supplementary General Conditions, and Division 1 Specification Sections) shall apply to this Section.

1.02 SECTION INCLUDES

A. Fixed modular plastic laminate clad casework and components.

B. Plastic laminate countertops .

1.03 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 06 61 16 - Solid Surface Fabrications

C. Section 07 92 00 - Joint Sealants

D. Section 09 21 16 - Gypsum Board Assemblies

1.04 REFERENCES

A. AWI Section 400 (Architectural Cabinets)

1.05 DEFINITIONS

A. Definitions in the AWI/AWMAC/WI's "Architectural Woodwork Standards" apply to the Work of this Section.

B. Manufactured Plastic Laminate Faced Casework (from here on referred to as "Casework") shall refer to laminated plastic casework, cabinets, shelving, counter, counters, related hardware, and items indicated on the Drawings and specified.

C. TFM: Thermally Fused Melamine-Clad Particleboard.

D. LPDL: Low-Pressure Decorative Laminate.

E. MDF: Medium Density Fiberboard.

F. MR MDF: Moisture-Resistant MDF.

1.06 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that casework can be supported and installed as indicated.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualification:
   1. Woodwork Institute accredited Millwork Company in good standing.
   2. A firm with no less than five years of production experience similar to a specific project, whose qualifications indicate the ability to comply with the requirements of this Section.
   3. Single Source Manufacturer: Casework, countertops, and architectural millwork products must all be engineered and built by a single source manufacturer to ensure consistency and quality for these related products. Splitting casework, countertops, and/or architectural millwork between multiple manufacturers will not be permitted.

B. Installer Qualifications: An authorized representative who is trained and approved by the manufacturer.

C. Quality Standard:
   1. ANSI/AWI 0641-2019 "Architectural Wood Casework Standard", shall be used to establish the minimum standard for casework construction to be provided on the project.
      a. Aesthetic Grade: Premium

b. Performance Level: 1

1.08 SUBMITTALS

A. Product Data: For each type of product.

B. Shop drawings: Include plans, elevations, sections, details, and attachments to other work. Approved shop drawings and field verifications shall be obtained before fabrication.

C. Keying Schedule: Include a keying chart that indicates whether cabinets by room are keyed alike, keyed differently, and the number of master keys required.

D. Samples for Verification: For the following:
   1. Laminate for each pattern selected.
   2. PVC edging for each pattern selected.
   3. Thermally fused melamine for each pattern selected.
   4. Hardware for each finish selected.

1.09 DELIVERY, STORAGE, & HANDLING

A. Deliver casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored other than installation areas, store only in areas where environmental conditions meet minimum requirements for building conditioning for installation of finishes.

B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.10 FIELD CONDITIONS

A. Maintain indoor temperature and humidity within the range recommended by the manufacturer.

B. Established Dimensions: Where casework is indicated to fit other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at the site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

C. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.11 WARRANTY

A. Special Manufacturers Warranty: The manufacturer shall warrant the products specified in this Section against material defects, or defects in manufacturing, for two (2) years from the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Specified Manufacturer: Advanced Cabinet Systems (ACS)
   1. Other Acceptable Manufacturers with equivalent products to the specified manufacturer shall include:
      a. Advanced Cabinet Systems (Marion, Indiana)
      b. Stevens Industries (Teutopolis, IL)
      c. Case Systems (Midland, MI)
      d. TMI Systems Corporation (Dickinson, ND)
      e. FADCO (Tulsa, OK)
      f. C.S. Humphrey & Company, LLC (Kansas City, MO)

B. Products of unnamed manufacturers with equivalent products to the specified manufacturer will be considered in accordance with the “or equal” provision specified in Division 01 “Product Requirements”.
   1. Product Substitutions: Comply with the requirements specified in Division 01 “Substitution Procedures”.

2.02 CASEWORK, GENERAL

A. Quality Standard: Architectural Woodwork Standards (AWS), Premium Grade.

B. Cabinet Construction: Flush overlay (concealed hinges).

C. Cabinet Grain Direction for Wood Grain Plastic Laminate (when applicable):
   1. Vertical on door and drawer fronts with continuous vertical matching.
   2. Vertical on end panels.
   3. Side-to-side on bottoms and tops of units.
   4. Vertical on knee-space panels.
   5. Horizontal on aprons.

2.03 MATERIALS

A. General: Provide materials that comply with requirements of AWI's quality standard specified, unless otherwise indicated.

B. Lumber shall be in accordance with the AWS Grade specified for the product being fabricated. Moisture content shall be 6% to 12% for boards up to 2-inches thick and shall not exceed 19% for thicker pieces.

C. Particle Board: ANSI A208.1, Mat-Formed Particle Board, Grade M-2, made with a binder containing no urea-formaldehyde.
   1. Density: 45-pound, minimum.
   2. Thickness: 3/4-inch, minimum.

D. Hardboard: ANSI A135.4, Class 1, Tempered.

E. Decorative Laminates: Shall be High-Pressure Decorative Laminate (HPDL):
   1. Compliance: NEMA LD 3, and ANSI A161.2.
      a. Grades as required by the woodwork quality standards.
   2. Grades and Thickness:
      a. VGS: Vertical Grade, 0.028-inches thick.
      b. HGS: Horizontal Grade, 0.048-inches thick.
      c. HGP: Horizontal Grade, Post-formed, 0.039-inches thick.
      d. VGP: Vertical Grade, Post-Formed, 0.028-inches thick.
      e. HGF (when applicable): Horizontal application, fire retardant material.
      f. VGF (when applicable): Vertical application, fire retardant material.
      g. CLS: Cabinet Liner, 0.020-inches thick.
      h. BKH: Backer, 0.020-inches thick.
      i. TFM: Thermally Fused Melamine Laminate Panels: NEMA LD 3, Grade VGL, 100 grams. Finish shall be resistant to water and mild cleaners.

F. Medium Density Fiberboard (MDF):
   1. Compliance: ANSI A208.2, Grade 130.

G. Moisture-Resistant MDF (MR-MDF): Where countertops receive sinks, lavatories, or are subjected to liquids:
   1. Product: "Medex", as manufactured by Roseburg Forest Products Company.
      a. Compliance: ANSI A208.2 - Grade 155; MR50.
      b. Density: 45-pcf, minimum.

H. Edgebanding: Refer to the "Edgebanding" Article in this Section.

I. Adhesives: Chemical-resistant waterproof adhesive as recommended by the manufacturer of materials being joined. Do not use adhesives that contain urea-formaldehyde.

J. Joint Sealant: Mildew-resistant silicone sealant.

2.04 CABINET SURFACES

A. Exterior Surfaces of Cabinets:

1. Door and Drawer Fronts: HPDL, Grade VGS. Provide a balanced backing sheet (BKH) on all door and drawer fronts.
2. Cabinet Sides: HPDL, Grade VGS.
3. Wall Cabinets - Bottoms:
    a. 48-inches or more above finished floor: HPDL, Grade VGS.
    b. Less than 48-inches above finished floor: HPDL , Grade HGS.
4. Wall Cabinets, Tall Cabinets, and Hutches - Tops:
    a. 80-inches or taller, and not visible from above: HPDL, Grade VGS.
    b. Less than 80-inches tall, or visible from above: HPDL, Grade HGS.
5. Sloped Tops on Tops of Wall Cabinets, and Tall Cabinets: HPDL, Grade HGS
6. Soffit Panels on Tops of Wall Cabinets, and Tall Cabinets: HPDL, Grade HGS
7. Edges: Refer to the "Edgebanding" Article in this Section.

B. Interior Surfaces of Cabinets - Exposed (open interiors):
1. Application: Any open storage unit without solid door or drawer fronts, units with glass or acrylic inserts in the doors, and units with sliding doors.
2. Open Cabinet Interior (Top, bottom, back, sides, horizontal and vertical members): HPDL, Grade VGS.
3. Open Cabinet Shelving: HPDL, Grade VGS.
4. Edges: Refer to the "Edgebanding" Article in this Section.

C. Interior Surfaces of Cabinets - Semi-Exposed (closed interiors):
1. Application: Surfaces behind opaque doors and drawers.
2. Door and Drawer Fronts: HPDL, Grade VGS.
3. Cabinet Interior: Top, bottom, back, sides, horizontal and vertical members: HPDL, Grade TFM; Color shall be White.
4. Closed Cabinet Shelving: HPDL, Grade VGS.
5. Edges: Refer to the "Edgebanding" Article in this Section.

D. Concealed Surfaces of Cabinets:
1. Surfaces that are not visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets; HPDL, Grade TFM, CLS, or BKH at Manufacturer's Option.

E. Toe Kicks: Resilient base (by others).

F. Drawer Boxes: Clear Finish.

2.05 EDGEBANDING

A. Edgebanding:
1. Manufacturer: Rehau, or equivalent
2. Material: Rigid PVC extrusion; through color with a satin finish.
    a. Color: Match plastic laminate color/s

B. Edgebanding Thickness:
1. Cabinet Box Edges: 1-mm PVC
2. Door and Drawer Fronts: 3-mm PVC
3. Adjustable Shelves - Closed Cabinets Interiors: 3-mm PVC, front edge only
4. Adjustable Shelves - Open Cabinet Interiors: 3-mm PVC, front edge only
5. Tops of Wall Cabinets, Tall Cabinets, and Hutches: 1-mm PVC

2.06 CASEWORK FABRICATION

A. Cabinet Body Construction:
1. Balanced construction of all laminated panels is mandatory.
    a. Unfinished core stock surfaces, even on concealed surfaces (excluding edges), are not permitted.
2. Tops, Bottoms, and Side Panels:

a. Core Material (Typical): 3/4-inch thick particleboard core with HPDL or TFM finish depending on the exposure.
    1) Exception: Sink Cabinets: Core shall be 3/4-inch thick Moisture-Resistant MDF (MR-MDF) with HPDL or TFM finish depending on the exposure.
b. Side panels and vertical dividers shall receive adjustable shelf hardware at 32mm line boring centers. Mount door hinges, drawer slides, and pull-out shelves in the line boring for consistent alignment.
c. Edgebanding: Refer to the "Edgebanding" Article in this Section.

3. Back Panels:
    a. Closed Cabinets: 1/2-inch thick particleboard core with HPDL or TFM finish depending on the exposure.
        1) Core Material (Typical): 1/2-inch thick particleboard core with TFM finish.
            (a) Exception: Sink Cabinet shall be 1/2-inch thick Moisture-Resistant MDF (MR-MDF) with TFM finish depending on the exposure.
        2) The back shall be dadoed into sides, bottoms, and tops of closed cabinets.
    b. Open Cabinets: 3/4-inch thick particleboard core with HPDL finish.
        1) The back shall be dowelled into sides, bottoms, and tops of open cabinets.
4. Cabinet Bases:
    a. Material: 3/4-inch, 45-pound density particle board.
    b. Height: 4-inches, unless noted otherwise.
    c. Base Options:
        1) Individual factory-applied base.
        2) Separate Cabinet Bases (Contractor Option): Bases to be continuous per elevation with cross members on 16-inch centers.
5. Base Units: Provide with an open top and a stretcher at the front, attached to the sides.
    a. Sink Base Units: Provide with an open top and a stretcher at the front, attached to the sides. Back to be split removable access panel.

B. Adjustable Shelves in Cabinets:
1. All shelving shall be a 1-inch thick particleboard core with HPDL finish.
2. All shelving shall be fully adjustable on 2-inch centers, with 5mm diameter holes.
3. Edgebanding: Refer to the "Edgebanding" Article in this Section.

C. Door and Drawer Fronts:
1. 3/4-inch particleboard core with HPDL finish.
    a. Sink Cabinets: Core shall be Moisture-Resistant MDF (MR-MDF) with HPDL finish.
2. Edgebanding: Refer to the "Edgebanding" Article in this Section.

D. Drawer Bodies (Standard drawer):
1. Drawer sides and back shall be 1/2-inch thick hardwood with fully dovetailed front, back, and sides, and 1/4-inch thick hardwood plywood or tempered masonite bottoms.
2. All exposed top, sides, bottoms, and backs of wood (and masonite) to have factory finish of two (2) coats lacquer.
3. Drawer Configuration: Standard drawer.
4. Drawer Slides:
    a. Drawer Slide Operation: Full extension.
    b. File Drawer Slides: Full extension.
    c. Refer to the "Drawer Slides" Article in this Section.
5. Drawer Box Length: 21-5/8 inches unless otherwise indicated.
6. Testing Standards: Meet or exceed ANSI/BHMA A156.9, Grade 1.
    a. Static load capacity: 100 lbs.
    b. Dynamic load capacity: 75 lbs.
    c. Test to perform 100,000 open/close cycles without failure.

E. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from the same material and with the same finish as cabinets.

2.07 JOINERY OF CASE BODY MEMBERS

A. Acceptable Joinery Methods:
   1. Tops, exposed ends, and bottoms:
      a. Stop dado, glued with pressure, and either nailed, stapled, or screwed (fasteners will not be visible on exposed parts), or
      b. Doweled, glued with pressure; approx. 4 per foot, or
      c. European assembly screws:
         1) Fasteners are to be used no more than 37mm from each end, with subsequent screws no more than 128-mm on-center.
         2) Screw heads and/or plastic trim caps shall not be visible on exposed parts.
         3) Glue is not required with this system.
   2. Cabinet Backs - Wall-Mounted Cabinets:
      a. Captured in grooves on cabinets sides and bottom; securely fastened.

B. Cabinet backs - Floor-Standing Cabinets:
   1. Side bound, captured in grooves; securely fastened to top and bottom.

2.08 HARDWARE

A. Provide cabinet hardware and accessory materials associated with architectural cabinets.

B. Exposed Hardware Finishes: For exposed hardware, provide a finish that complies with BHMA A156.18 for the BHMA finish number indicated.
   1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
   2. Satin Stainless Steel: BHMA 630.

C. Concealed Hardware Finishes: Provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

D. Hinges:
   1. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602, 170-degrees of opening, self-closing.
      a. Product:
         1) Hinge: Blum; Inserta Clip Top No. 71T6540B, or equivalent
         2) Hinge Plates: Blum; Inserta No. 174H7100i, or equivalent
      b. Hinge Quantity:
         1) Provide two hinges for doors up to and including 36-inches high.
         2) Provide three hinges for doors over 36-inches, up to and including 54-inches high.
         3) Provide four hinges for doors over 54-inches up to and including 72-inches high.
         4) Provide five hinges for doors over 72-inches high.

E. Drawer and Door Pulls:
   1. Wire Pulls, Surface-mounted, BHMA A156.9:
      a. Application: Typical door and drawer pulls throughout Project. Refer to the interior elevations in the Drawings for clarification.
      b. Basis of Design: Berensen; Model #6130-2SC-P Back Mounted Wire Pulls or equivalent.
         1) Material: Steel
         2) Finish: Satin Chrome
         3) Center-to-Center: 4-inches
         4) Diameter: 5/16-inches
         5) Projection: 1-1/4 inches
      c. Provide two pulls for drawers more than 27-inches wide.
      d. Provide 1-inch long mounting screws.
      e. Other Acceptable Manufacturers:
         1) Doug Mockett
         2) Amerock

3) Rok Hardware
4) Jako Hardware
5) or equivalent

2.09 MISCELLANEOUS HARDW

A. Door Catches:
1. Base and Wall Cabinets: Self-aligning, permanent magnetic catches.
2. Tall Cabinets: Nylon-roller spring catch.
a. Provide two catches on doors more than 48-inches high.

B. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
1. Doors: Provide one bumper at the top and bottom of the closing edge of each swinging door.
2. Drawers: Provide one bumper on the backside of the drawer fronts at each corner.

C. Adjustable Shelf Supports:
1. Product: Hafele; Item # 282.47.402, Shelf Support - Heavy-Duty, Transparent
a. Two-pin (5-mm) for a 32-mm system, locks 1-inch shelves, complies with BHMA A156.9

2.10 DRAWER SLIDES

A. Test Standards: ANSI / BHMA A156.9
1. Product Grade/ Load Rating:
a. Grade 1: 50-lb (22.2-kg) load rating
b. Grade 2: 30-lb (13.3-kg) load rating
c. Grade 3: 20-lb (8.9-kg) load rating
d. Grade 1HD-100: 100-lb (44.5-kg) load rating
e. Grade 2HD-200: 200-lb (90-kg) load rating

B. Specified Manufacturer: Accuride
1. Other Manufacturers: Products of Knape & Vogt (K&V), Hafele, or approved equivalent.

C. Standard Box Drawer Slides:
1. Product: Accuride 3832, or equivalent.
a. Applications: Regular, knee space, and pencil drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide
b. Grade: 1HD-100
c. Design: Epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop in both directions with a self-closing feature.

D. Heavy-Duty Box Drawer Slides:
1. Product: Accuride 4032, or equivalent.
a. Applications: Paper storage drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
b. Grade: 2HD-200
c. Design: Full extension, epoxy-coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop in both directions with a self-closing feature.

E. File Drawer Slides:
1. Product: Accuride 4032
a. Applications: Letter/ legal file drawers
b. Grade: 1HD-100
c. Design: Full extension, 150-pound load rated epoxy coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop in both directions with a self-closing feature.

F. Lateral File Drawer Slides:
1. Product: Accuride 4032
a. Applications: Lateral file drawers, 30-inches and wider

b. Grade: 2HD-200
c. Design: Full extension, epoxy-coated steel, bottom corner mounted with smooth and quiet nylon rollers. Positive stop in both directions with a self-closing feature.

2.11 DOOR AND DRAWER LOCKS

A. Door and Drawer Locks (Standard):
1. Cam Locks:
a. Product: Olympus; DCN Series:
1) Keyways: Re-keyable via cylinder retainer clip.
(a) Master-keyed: N Series, National D4292, 5-pin system.
2. Compliance: ANSI/BHMA Grade 1
3. Standard Function: Key removable in a locked or unlocked position. Standard function locks are non-handed.
4. Cams: Provide one reversible straight cam and one reversible offset cam.
5. Cam locks will have a 1-inch face diameter and include an anti-rotation plate to trap the hex nut and prevent the lock from twisting in the hole.
6. All locks will provide functionality such that the keyway will remain in the vertical position regardless of installation as a door or drawer.
7. Barrel Length: 15/16-inch, 1-3/8 inch, and1-5/8-inch as needed.
8. Angle Strike: Olympus #12-3.
9. Finish: US26D.

B. Lock Locations:
1. Provide locks on tall storage cabinets as shown on drawings.
2. Provide locks on file drawers as shown on drawings
3. Provide locks on base cabinet doors and drawers as shown on drawings.
4. Provide locks on wall cabinet doors as shown on drawings.

2.12 PLASTIC LAMINATE MATERIAL

A. Plastic Laminate Material, designated in the Drawings as Finish Type PLAM- #
1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information

B. Products:
1. Manufacturer: As scheduled on the Interior Finish Legend
2. Product Code: As scheduled on the Interior Finish Legend
3. Color: As scheduled on the Interior Finish Legend

C. Laminate Properties:
1. Laminate Composition: Decorative surface papers impregnated with melamine resins and pressed over kraft paper core sheets impregnated with phenolic resin. Sheets then bonded together under high pressure and high temperatures. Finished sheets trimmed and backs sanded to facilitate bonding to the substrate.
2. Surface Burning Characteristics:
a. Test Standards: ASTM E 84, ASTM E 162, ASTM E 662, IMO FTP Code Part 2 and Part 5, and UL 723.
b. Interior Finish Classification, Fire-Rated Laminate: Class A according to NFPA 101.
c. Flame Spread Index: Less than 25; Smoke Developed Index: Less than 450.
3. Surfaces Subject to Food Contact: Comply with NSF Standard 35.
4. Grades: Refer to the "Materials" Article in this Section.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting the performance of the Work.

3.02 PREPARATION:

A. Condition casework to average prevailing humidity conditions in installation areas before installing.

3.03 INSTALLATION

A. Erect casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

B. Separate Cabinet Bases: At the contractor's option, install separate cabinet bases before remaining casework as required to coordinate with the installation of flooring and base.

C. Provide and install scribe strips to adjoining walls, accurately fitted, installed with fastenings.

D. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch. Bolt adjacent cabinets together with joints flush, tight, and uniform.

E. Wall Cabinets: Hang wall cabinets straight, level, and plumb. Adjust fronts and bottoms to align in a single plane or straight line. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions to provide positive anchorage. Align similar adjoining doors to align in a straight line.

F. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

G. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

H. Repair or remove and replace defective work as directed on completion of installation.

I. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by the manufacturer.

3.04 CLEANING

A. Remove and dispose of all packing materials and related construction debris.

B. Clean cabinets inside and out. Wipe off fingerprints, pencil marks, and surface soil, etc., in preparation for final cleaning by the building owner.

3.05 PROTECTION

A. Protect completed work from damage during remainder of the construction period.

B. DO NOT stand on the installed countertops for any reason.

END OF SECTION 12 32 16

SECTION 12 35 70
MANUFACTURED METAL CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enameled-steel casework (hereby referred to as "Steel Casework")

B. Stainless-steel countertops and sinks.

C. Service fittings and outlets.

1.02 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry

B. Section 07 92 00 - Joint Sealants

C. Section 09 21 16 - Gypsum Board Assemblies

1.03 REFERENCE STANDARDS

A. ASTM A666/A666M - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2024.

B. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable; 2021.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

D. ASTM D522/D522M - Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings; 2017 (Reapproved 2021).

E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

F. BHMA A156.9 - Cabinet Hardware; 2020.

G. SEFA 2 - Installations; 2010.

H. SEFA 3 - Laboratory Work Surfaces; 2010.

I. SEFA 7 - Laboratory Fixtures; 2010.

J. SEFA 8M - Laboratory Grade Metal Casework; 2016.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of steel casework with related items.

B. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

C. Keying Conference: Conduct conference prior to ordering keys. Incorporate conference decisions into keying submittal.

1.05 SUBMITTALS

A. Product Data: Details of materials, component dimensions and configurations, construction details, joint details, attachments; manufacturer's catalog literature on hardware and keying, accessories, and service fittings, if any.

B. Shop Drawings: Indicate steel casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and anchors and reinforcements placement dimensions and tolerances, clearances required, and utility locations, if any. Include coordinated information for laboratory equipment specified in another section and/or furnished by Owner.

C. Test Reports: Independent laboratory reports showing compliance with chemical and physical resistance requirements for casework finish.

D. Manufacturer's Installation Instructions.

E. Manufacturer's qualification statement.

F. Installer's qualification statement.

G. Maintenance Data: Manufacturer's recommendations for care and cleaning.

1.06 MAINTENANCE MATERIAL

A. Furnish complete touchup kit for each type and color of steel casework provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged steel casework finish.

1.07 QUALITY ASSURANCE

A. Source Limitations: Obtain steel casework through one source from a single manufacturer.

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.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.

1.09 OWNER STANDARD

A. Cabinetry located in Clean Rooms and Soiled Rooms shall be steel cabinetry w/ metal soffits whether shown as such in the drawings or not.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Specified Manufacturer: Jamestown Metal Products (Division of Institutional Casework, Inc. - ICI) : www.iciscientific.com/#sle.

B. Other acceptable manufacturers with equivalent products to the specified manufacturer shall include:
   1. Hamilton Laboratory Solutions: www.hamiltonlab.com/#sle.
   2. Kewaunee Scientific Corp: www.kewaunee.com/#sle.
   3. Mott Manufacturing Ltd: www.mott.ca/#sle.

C. Obtain steel casework from single source and manufacturer, unless otherwise indicated.

2.02 STAINLESS- STEEL CASEWORK

A. Basis of Design Product: ICI; Cornerstone Series Steel Casework.

B. Description: Die-formed metal sheet; each unit self-contained and not dependent on adjacent units or building structure for rigidity; factory-fabricated, factory-assembled, and factory-finished.

C. Style: Flush overlay - square edge.

D. Primary Cabinet Material: Stainless steel.

E. Cabinet Nominal Dimensions: Unless otherwise indicated, provide cabinets of widths, depths, and heights indicated on drawings, and with following inside clear dimensions (front-to-back)
   1. Base Cabinets: 22 inch, unless indicated otherwise.
   2. Tall Cabinets: 16 inch, unless indicated otherwise.
   3. Upper Cabinets: 13 inch, unless indicated otherwise.

F. Minimum Nominal Steel Thicknesses for Steel Casework:
   1. Sides, Ends, Fixed Backs, Bottoms, Cabinet Tops, Soffits, Sloped Tops, and Items Not Otherwise Indicated: 18 gauge, 0.0478 inch.
      a. Exception: Bottoms may be 20 gauge, 0.0359 inch if reinforced.
   2. Back Panels, Doors, Drawer Fronts and Bodies, Shelves, Cabinet Floors, Filler Strips, Trim Flanges, and Drawer Dividers: 20 gauge, 0.0359 inch.

a. Exception: 18 gauge, 0.0478 inch for unreinforced shelves more than 36 inches (900 mm) long.
3. Intermediate Horizontal Rails, Center Posts, and Top Gussets: 0.060 inch (1.52 mm).
4. Drawer Runners and Hinge Reinforcements: 0.075 inch (1.90 mm).
5. Leveling and Corner Gussets: 0.105 inch (2.66 mm).

G. Structural Performance Requirements: In addition to the requirements of SEFA 3, SEFA 7 and SEFA 8M, provide components that safely support the following minimum loads, without deformation or damage:
1. Base Units: 500 pounds per linear foot across the cabinet ends.
2. Suspended Units: 300 pounds, minimum, static load.
3. Tables: 300 pounds on four legs.
4. Drawers: 100 lbs (45.35 kg).
5. Hanging Upper Cases: 300 pounds.
6. Shelves: 40 lbs/sq.ft., up to 200 lbs.

H. Seismic Performance: Casework, including attachments to other work, able to withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Structural Design Standard: See Structural Drawings
2. Seismic Design Category: Category B

I. Fabrication:
1. General: Assemble and finish units at the point of manufacture. Use precision dies for interchangeability of like-size drawers, doors, and similar parts. Perform assembly on precision jigs to provide units that are square. Reinforce units with angles, gussets, and channels. Integrally frame and weld to form a dirt and vermin-resistant enclosure. Maintain uniform clearance around door and drawer fronts of 1/16 to 3/32 inch (1.5 to 2.4 mm).
2. Corners and Joints: Without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.
3. Edges and Seams: Smooth. Form countertops and shelves from continuous sheets.
4. Ends: Close open ends with matching construction.
5. Welding: Electric spot welded; joints ground smooth and flush.
6. Flush Overlay Drawers and Doors: 20 gauge, 0.0359 inch; Fabricate drawer and door fronts of sandwiched sheets of sheet steel welded together and reinforced for hardware.
a. Fill doors with sound-deadening material.
7. Metal Shelves: 20 gauge, 0.0359 inch unless indicated otherwise.
a. Shelf Edges: Adjustable and fixed shelves formed down 3/4 inch, returned back 7/8 inch, and up 1/4 inch into a channel shape, front and rear; formed down 3/4 inch at each end. Shelves over 42 inches long to be reinforced with a channel welded to underside of shelf.
b. Provide clips, brackets, pilasters, or other means to support shelves from cabinet ends and allow the height of shelves to be adjusted in increments of not more than 1-1/2 inch centers.
8. Fittings and Fixture Locations: Cut and drill countertops, backs, and other steel casework components for service outlets and fixtures.
9. Removable back panels on all base cabinets. Partial height back panels at sink cabinets.
10. Filler Panels: 20 gauge, 0.0359 inch; Flanged on both sides, of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction. Provide as needed to close spaces between cabinets and walls, ceilings, and equipment as indicated in drawings.
11. Soffits for Upper and Floor Cabinets: 20 gauge, 0.0359 inch minimum, with closed ends, flanged to allow attachment to cabinet(s) below. Soffit faces shall be flush with casework below and constructed of the same material and with the same finish as cabinets.
12. Stainless Steel Surface Finish: No.4, brushed finish.

2.03 CABINET HARDWARE

A. Manufacturer's standard styles, and as indicated below.

B. Comply with BHMA A156.9 requirements.

C. Acceptable base materials for plated finishes include brass, bronze, and steel.
   1. Finish of exposed stainless steel components: No.4 finish.

D. Shelves in Cabinets:
   1. Shelf Standards and Rests: Vertical standards with rubber button fitted rests, satin chromium plated over nickel on base material.

E. Swinging Door Hardware:
   1. Hinges: Stainless steel 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and hospital tips., number of hinges as required by referenced standards for width, height, and weight of door.
   2. Door Catches: Dual, self-aligning, permanent Magnetic catches. Provide 2 catches on doors more than 48 inches (1200 mm) high.
   3. Door Pulls: Chrome-plated brass wire pulls, 4 inches wide.

F. Drawer Hardware:
   1. Drawer Pulls: Chrome-plated brass wire pulls, 4 inches wide.
   2. Drawer Slides: BHMA A156.9, Type B05091; Side-mounted, zinc-plated steel, full extension arms, self-closing, ball-bearing drawer slides; capacity as recommended by manufacturer for drawer height and width.

2.04 COUNTERTOP

A. Stainless Steel Countertops: , Type 304, stainless steel sheet; 16 gauge, 0.0625 inch nominal sheet thickness, per ASTM A666/A666M.
   1. Finish: No. 4, satin brushed finish.
   2. All exposed surfaces of countertops shall be 16 GA stainless steel reinforced on the underside with 18 GA galvanized steel hat channels, soldered in place and spaced to prevent twisting, oil-canning or buckling, and to provide a mounting surface where the top interfaces with cabinets beneath.
   3. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1 inch return to face of case; reinforced with steel.
   4. Back and End Splashes: Splashes on the back or ends of the top shall be formed from the same sheet, when tooling permits, or spot-welded directly to the top.
      a. Dimensions: 4 inches (100 mm) and 6 inches (150 mm) high by 1 inch wide top surface and minimum 1/2 inch turndown.
   5. Integrated Stainless-Steel Sinks:
      a. Fabricate from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch (16-mm) radius. Slope the sink bottoms to outlet without channeling or grooving.
      b. Sink bowl shall be so welded to the top as to form an integral part thereof. All welds shall be ground smooth and polished to a uniform satin finish over the entire top and sink bowl assembly.
         1) Soldering of the sinks, curbs or splash rails to the top shall not be permitted.
      c. Dimensions - Sink Type S-#, inside dimensions:
         1) Length: TBD.
         2) Width: TBD.
         3) Depth: TBD.
      d. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch (13- mm) diameter, where applicable.
      e. Factory punch holes for fittings.
      f. Provide sinks with stainless-steel strainers and tailpieces.

6. Apply 1/8-inch- (3-mm-) thick coating of heat-resistant, sound-deadening mastic to underside of countertops and sink surfaces.
7. Mechanical joints or field joints, where made necessary by size, shall be a tight butt joint of the top surfaces, reinforced and held in alignment with steel reinforcements.

2.05 MATERIALS

A. Stainless Steel Sheet: ASTM A666/A666M, Type 304, #4 finish one side

B. Sound Deadening Material: Inorganic, for sandwich panel fabrication.

C. Sealant For Use in Casework Construction: Manufacturer's recommended type.

D. Sealant For Use in Casework Installation:
1. One component, clear silicone base sealant, chemical curing complying with ASTM C920, Type S, Grade NS, Class 25, Use NT, when tested to glass and aluminum, anti-fungus composition.

2.06 FINISH

A. Stainless Steel Finish: No.4, brushed finish.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify adequacy of support framing and anchors.

B. Verify that service connections are correctly located and of proper characteristics.

3.02 INSTALLATION

A. Perform installation in accordance with manufacturer's instructions and with SEFA 2.

B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.

C. Set casework items plumb and square, securely anchored to building structure, with no distortion.
1. Base Cabinets: Examine floor levelness and flatness of installation space. Do not proceed with installation if encountered floor conditions required more than 3/4 inch leveling adjustment. When installation conditions are acceptable, for each space, establish the high point of the floor. Set and make level and plumb first cabinet in relation to this high point.
2. Wall Cabinets: Examine wall surfaces in installation space. Do not proceed with installation if the following conditions are encountered:
   a. Maximum variation of finished gypsum board surface from true flatness exceeds 1/8 inch in 10 feet in any direction.

D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.

E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
2. Variation of Bottoms of Upper Cabinets from Level: 1/8 inch in 10 feet .
3. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
4. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
5. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.

F. Secure upper and floor cabinets to concealed reinforcement and blocking at gypsum board assemblies.

G. Separate dissimilar metals to prevent galvanic action.

H. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.

I. Adjust casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by the manufacturer.

J. Replace units that are damaged, including those that have damaged finishes.

K. Countertops: Install countertops in one true plane, with ends abutting at hairline joints, and no raised edges.
   1. Attach stainless steel countertops using stainless steel fasteners and clips.
   2. Seal joint between curbs and splashes and vertical surfaces.

3.03 ADJUSTING

A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

3.04 CLEANING

A. Clean exterior and interior surfaces of all steel casework items, countertops, and accessory items per the manufacturer's instructions.

3.05 PROTECTION

A. Protect casework and countertops from ongoing construction activities. Prevent contractor and subcontractor from standing on, or storing tools and materials on the countertops.

B. Repair damage that occurs prior to Date of Substantial Completion, including finishes, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

END OF SECTION 12 35 70

SECTION 12 36 00
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for manufactured casework.

1.02 RELATED REQUIREMENTS

A. Section 12 32 16 - Manufactured Plastic Laminate Faced Casework

1.03 REFERENCE STANDARDS

A. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications; 2022.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2023.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2023.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards, 2nd Edition; 2014, with Errata (2016).

E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards; 2021, with Errata.

F. IAPMO Z124 - Plastic Plumbing Fixtures; 2022.

G. ISFA 2-01 - Classification and Standards for Solid Surfacing Material; 2013.

H. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

I. NSF 51 - Food Equipment Materials; 2021.

J. SEFA 3 - Laboratory Work Surfaces; 2010.

1.04 SUBMITTALS

A. See Section 01 31 00 - Project Management and Coordination for submittal procedures.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

C. Shop Drawings: Complete details of materials and installation ; combine with shop drawings of cabinets and casework specified in other sections.

D. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

E. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

F. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

G. Installer's qualification statement.

H. Installation Instructions: Manufacturer's installation instructions and recommendations.

I. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD 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 manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 COUNTERTOPS

A. Quality Standard: SEFA 3 for laboratory worksurfaces.

2.02 PLASTIC LAMINATE COUNTERTOPS

A. Plastic Laminate Countertops: Refer to Section 12 32 16 - Manufactured Plastic Laminate Faced Casework.

2.03 SOLID SURFACING COUNTERTOPS

A. Solid Surfacing Countertops: Solid surfacing sheet or plastic resin casting over continuous substrate.
   1. General:
      a. Uses: Countertops, Work Counters, Lavatory Countertops, and Window Sills.
      b. Solid Surfacing Fabrications are designated in the Drawings as Finish Type SSF- #.
         1) Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information
      c. Flat Sheet Thickness: 1/2 inch, minimum.
      d. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous, and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
   2. Manufacturers:
      a. Dupont: www.corian.com/#sle.
      b. Formica Corporation: www.formica.com/#sle.
      c. Wilsonart: www.wilsonart.com/#sle.
   3. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
   4. Sinks and Bowls: Separate units for undercounter mounting; minimum 3/4 inch wall thickness; comply with IAPMO Z124. Refer to the "Integrated Solid Surface Sinks" Article in this Section, for requirements.
   5. Finish on Exposed Surfaces: Matte, gloss rating of 5 to 20.
      a. Color and Pattern: As indicated on drawings.
   6. Solid surface countertops shall be built up with a 1/2-inch thick solid surface sheet over a 1-inch thick MDF (or MR-MDF) sub-top.
      a. Edge Thickness: 1-1/2 inches.
      b. Depth: As indicated in the Drawings, maximum 24-inches.
      c. Edge Profile: Eased edge unless otherwise indicated.
      d. Overhang: 1-inch (25-mm) beyond face of base cabinets.
      e. Back, Side, and End Splashes: Same sheet material, square top; minimum 4 inches high. Provide loose fabrications to be field set, unless noted otherwise.
   7. Window Sills:
      a. Solid Surface Material Type: As scheduled.
      b. Thickness: 1/2-inch
      c. Sill Depth: As indicated on drawings.
      d. Overhang: 1/2-inch
      e. Length: Field verify

f. Edges: Eased Edges.

8. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Premium Grade.

2.04 STAINLESS STEEL COUNTERTOPS

A. Stainless-Steel Sheet: ASTM A240/A240M, Type 304 or 316, 16 gauge, 0.0625 inch (nom.)

1. Exposed Edge Shape: Straight turndown with return; 1-1/2 inch high face, 1/2 inch return to face of case ; reinforced with hardwood or steel.
2. Back and End Splashes: Same material; welded 1/4 inch radius coved joint to countertop; square top edge with 1 inch wide top surface and minimum 1/2 inch turndown.
3. Splash Dimensions: 4 inch high by 1 inch thick, unless otherwise indicated.
4. Splash Depth Where Faucets are Mounted in Splash: 2 inches.
5. Splash Height: 6 inch.
6. Stainless-Steel Sinks: Fabricate from stainless-steel sheet, not less than 0.050-inch (1.27-mm) nominal thickness. Fabricate with corners rounded and coved to at least 5/8-inch (16-mm) radius. Slope the sink bottoms to outlet without channeling or grooving. Provide continuous butt-welded joints.
   a. Provide sizes indicated or manufacturer's closest standard size of equal or greater volume, as approved by Architect.
   b. Provide double-wall construction for sink partitions with top edge rounded to at least 1/2-inch (13- mm) diameter.
   c. Factory punch holes for fittings.
   d. Provide sinks with stainless-steel strainers and tailpieces.
   e. Provide sinks with integral rims except where located in stainless-steel countertops.
   f. Apply 1/8-inch- (3-mm-) thick coating of heat-resistant, sound-deadening mastic to undersink surfaces.

2.05 MATERIALS

A. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.

B. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

C. Joint Sealant: Mildew-resistant silicone sealant, clear.

D. Sealer: Stain and acid protection for natural stone counters.

1. NSF approved for food contact per NSF 51.
2. Products:
   a. Custom Building Products: www.custombuildingproducts.com/#sle.
   b. Rockstar Sealing, a division of TuffSkin Surface Protection LLC; Natural Finish Stone Sealer: www.rockstarsealing.com/#sle.
   c. STONETECH, a division of LATICRETE International, Inc: www.laticrete.com/#sle.

2.06 INTEGRATED SOLID SURFACE SINKS

A. Products: Solid Surface Acrylic Sinks, as manufactured by ??, no substitutions.

1. Types and Sizes: As scheduled below.
2. Color: Refer to Interior Finish Legend

B. Mounting of Sinks to Countertop:

1. Hard Seam Undermount Installation: Where the edge of the deck and the sink bowl are flush, and the sink bowl is attached to the deck with adhesive.
   a. Rout the cutout for the sink in the countertop.
   b. Adhere bowl positioning blocks into position against the bowl with hot-melt adhesive.
   c. Adhere undermount sink to countertop using manufacturer's recommended adhesive.
   d. Use clamping devices to hold bowl until adhesive sets.

C. Integrated Solid Surface Sinks, designated in the Drawings as Finish Type IS- #

1. Refer to the "Interior Finish Legend" in the Drawings for pertinent information on this Finish Type, including manufacturer, model/pattern, color, size, and other related information
2. Lavatory Sink Bowls:
    a. Basis of Design Product: DuPont "Corian" Lavatory Sink Bowl:
        1) Type IS- #: Model 810P: 16-1/2 inch length by 13-1/8-inch width by 5-1/2 inch depth (inside sink dimensions), Oval, ADA compliant.
3. Countertop Sinks, Single Basin:
    a. Product: DuPont; "Corian" Countertop Sink, single bowl:
        1) Type IS- #: Model 5610: 16-inches by 21-inches by 6-1/4 inches deep, ADA compliant.
            (a) Color: TBD.
4. Countertop Sink, Double Basin:
    a. Basis of Design: DuPont; "Corian" Solid Surface Sink, double bowl.
        1) Type IS- #: Model No. 850: 28-7/8 inch length by 16-5/8 inch width by 9-1/2-inch depth (inside sink dimensions)
            (a) Color: TBD.

2.07 ACCESSORIES

A. Fixed Top-Mounted Countertop Support Brackets:
    1. Material: Steel.
    2. Finish: Manufacturer's standard, factory-applied, textured powder coat.
    3. Color: Black.
    4. Products:
        a. Substitutions: See section 006325.

2.08 FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
    1. Join lengths of tops using best method recommended by manufacturer.
    2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
        a. Rout a 1/8 inch drip groove at underside of exposed overlapping edges, set back 1/2 inch from face of edge.
    3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
    1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
    2. Height: 4 inches, unless otherwise indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Securely attach countertops to cabinets using concealed fasteners. Make flat surfaces level; shim where required.

B. Attach plastic laminate countertops using screws with minimum penetration into substrate board of 5/8 inch.

C. Attach stainless steel countertops using stainless steel fasteners and clips.

D. Apply sealer products in accordance with manufacturer's written instructions.

E. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

C. **DO NOT** stand on the installed countertops for any reason.

END OF SECTION 12 36 00

SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Manufacturer-engineered, shop-fabricated structural steel building frame.

B. Insulated Metal wall and roof panels including soffits, gutters and downspouts, and roof mounted equipment curbs.

C. Exterior doors, windows, skylights, overhead doors, and louvers.

1.02 REFERENCE STANDARDS

A. AISC 360 - Specification for Structural Steel Buildings; 2022.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2019.

C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2023.

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

E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2021.

F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.

G. ASTM A529/A529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality; 2014.

H. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.

I. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.

J. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink); 2020.

K. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength; 2022.

L. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2020, with Errata (2022).

M. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Metal Buildings Systems:
   1. Butler Manufacturing Company: www.butlermfg.com/#sle.
   2. Ceco Building Systems: www.cecobuildings.com/#sle.
   3. Chief Buildings: www.chiefbuildings.com/#sle.
   4. Kirby Building Systems: www.kirbybuildingsystems.com/#sle.
   5. Metallic Building Systems: www.metallic.com/#sle.
   6. Nucor Building Systems: www.nucorbuildingsystems.com/#sle.
   7. VP Buildings: www.vp.com/#sle.

2.02 ASSEMBLIES

A. Single span rigid frame.

B. Overall Spacing: 20'-0" x 25'-0" ft.

C. Primary Framing: Rigid frame of rafter beams and columns, canopy beams and braced end frames, and wind bracing.

D. Secondary Framing: Purlins, and other items detailed.

E. Wall System: Preformed metal panels of horizontal profile, with sub-girt framing/anchorage assembly, and accessory components.

F. Roof System: Preformed metal panels oriented parallel to slope, with sub-girt framing/anchorage assembly, insulation, and liner panels, and accessory components.

G. Roof Slope: 1/8 inches in 12 inches.

2.03 PERFORMANCE REQUIREMENTS

A. Installed Thermal Resistance of Wall System: R-value of ____.

B. Installed Thermal Resistance of Roof System: R-value of ____.

C. Design structural members to withstand dead load, applicable snow load, and design loads due to pressure and suction of wind calculated in accordance with applicable code.

D. Provide drainage to exterior for water entering or condensation occurring within wall or roof system.

E. Permit movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to temperature range of ____ degrees F.

2.04 MATERIALS - FRAMING

A. Structural Steel Members: ASTM A36/A36M.

B. Structural Tubing: ASTM A500/A500M Grade B cold-formed.

C. Plate or Bar Stock: ASTM A529/A529M, Grade 50.

D. Anchor Bolts: ASTM A307, Grade A, with no preference for protective coatings.

E. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1; galvanized to ASTM A153/A153M.

F. Welding Materials: Perform in accordance with AWS D1.1/D1.1M.

G. Primer: SSPC-Paint 20 zinc rich.

H. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
   2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

2.05 MATERIALS - WALLS AND ROOF

A. Steel Sheet: ASTM A792/A792M aluminum-zinc alloy coated to AZ50/AZM150.

B. Insulation: ASTM C665 Type I; ____ inches thick.
   1. Facing: Sheet vinyl, ____ inch thick, white.

C. Joint Seal Gaskets: Manufacturer's standard type.

D. Fasteners: Manufacturer's standard type, galvanized to comply with requirements of ASTM A153/A153M, finish to match adjacent surfaces when exterior exposed.

E. Sealant: Manufacturer's standard type.

F. Trim, Closure Pieces, Caps, Flashings, Gutters, Downspouts, Rain Water Diverter, Fascias, and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

2.06 COMPONENTS

A. Doors and Frames: Specified in Section 08 11 13.

B. Overhead Doors: Specified in Section 08 36 13.

2.07 FABRICATION - FRAMING

2.08 FABRICATION - WALL AND ROOF PANELS

A. Girts/Purlins: Rolled formed structural shape to receive siding, roofing and liner sheet.

B. Internal and External Corners: Same material thickness and finish as adjacent material, profile brake formed to required angles. Back brace mitered internal corners with ____ inch thick sheet.

C. Flashings, Closure Pieces, Fascia: Same material and finish as adjacent material, profile to suit system.

D. Fasteners: To maintain load requirements and weather tight installation, same finish as cladding, non-corrosive type.

2.09 FABRICATION - GUTTERS AND DOWNSPOUTS

A. Fabricate of same material and finish as roofing metal.

B. Form gutters and downspouts and scuppers of _____ profile and size indicated to collect and remove water. Fabricate with connection pieces.

C. Form sections in maximum possible lengths. Hem exposed edges. Allow for expansion at joints.

D. Fabricate support straps of same material and finish as roofing metal, color as selected.

2.10 FINISHES

A. Framing Members: Clean, prepare, and shop prime. Do not prime surfaces to be field welded.

B. Exterior Surfaces of Wall Components and Accessories: Precoated enamel on steel of modified silicone finish, _____ color as selected from manufacturer's standard range.

C. Interior Surfaces of Wall Components and Accessories: Precoated enamel on steel of modified silicone finish, _____ color as selected from manufacturer's standard range.

PART 3 EXECUTION

3.01 ERECTION - FRAMING

A. Erect framing in accordance with AISC 360.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing. Locate braced bays as indicated.

C. Set column base plates with non-shrink grout to achieve full plate bearing.

D. Do not field cut or alter structural members without approval.

E. After erection, prime welds, abrasions, and surfaces not shop primed.

3.02 ERECTION - WALL AND ROOF PANELS

A. Install in accordance with manufacturer's instructions.

B. Exercise care when cutting prefinished material to ensure cuttings do not remain on finish surface.

C. Fasten cladding system to structural supports, aligned level and plumb.

D. Locate end laps over supports. End laps minimum 2 inches. Place side laps over bearing.

E. Provide expansion joints where indicated.

F. Use concealed fasteners.

G. Install sealant and gaskets, providing weather tight installation.

3.03 ERECTION - GUTTERS AND DOWNSPOUTS

A. Rigidly support and secure components. Join lengths with formed seams sealed watertight. Flash and seal gutters to downspouts.

B. Slope gutters minimum ____ inch/ft.

C. Connect downspouts to storm sewer system.

D. Install splash pans under each downspout.

3.04 INSTALLATION - ACCESSORY COMPONENTS IN WALL SYSTEM

A. Install door frames, doors, overhead doors, and windows and glass in accordance with manufacturer's instructions.

3.05 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

END OF SECTION 13 34 19

SECTION 211300 – FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 DESCRIPTON OF WORK

A. The scope of work is a new fire suppression system for a new construction project. Scope of work includes:

1. Wet Pipe fire sprinkler system throughout building.
2. Provide fire pump if necessary, to meet fire sprinkler demand.

B. Provide all labor, services, material and related items necessary to complete the fire protection work indicated on drawings and described in the specifications herein and in accordance with applicable codes listed below.

1.2 RELATED DOCUMENTS

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

B. Related Sections include the following:

1. Division 10 Section "Fire Extinguisher Cabinets" and "Fire Extinguishers" for cabinets and fire extinguishers.
2. Division 22 Section "Facility Water Distribution Piping" for piping outside the building.

1.3 INFORMATIONAL SUBMITTALS

A. Product Data: Provide product data for each type of product including:

1. Piping materials, including sprinkler specialty fittings.
2. Pipe hangers and supports.
3. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
4. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
5. Hose connections, including size, type, and finish.
6. Fire department connections, including type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
7. Alarm devices, including electrical data.
8. Backflow Preventers.
9. All resubmittals shall clearly and thoroughly explain all changes/additions made to product literature to expedite re-review by engineer.

B. Shop Drawings: For wet-pipe sprinkler systems:

1. Include plans, elevations, sections, and attachment details.
2. Include diagrams for power, signal, and control wiring.

3. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification or Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

4. Grooved joint couplings and fittings shall be referred to on drawings and product submittals and be identified by the manufacturer's listed model or series designation.

5. All resubmittals shall clearly and thoroughly explain all changes made to plans and calculations, by clouding or written text, to expedite re-review by engineer.

6. Submit shop drawings to Architect/Engineer and Authorities Having Jurisdiction for approval.

C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

D. Delegated-Design Submittal: For sprinkler 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.

E. Contractor shall provide a current fire hydrant flow test.

F. Project Close-out Submittals:

1. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."

2. Field quality-control reports.

3. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

1.4 SPRINKLER SYSTEM DESCRIPTIONS

A. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of 175-psig (1200-kPa) maximum.

B. Standard-Pressure Fire Sprinkler Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.

1.5 DESIGN CRITERIA & PERFORMANCE REQUIREMENTS

A. Applicable Codes, Standards and Publications (use the referenced edition from the currently adopted building code edition):

1. NFPA 13, "Installation of Sprinkler Systems." Sprinkler system design shall comply with NFPA 13 and be approved by authorities having jurisdiction.

2. NFPA 20, "Stationary Fire Pumps,"

3. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

4. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory

5. Factory Mutual Engineering Corporation (FM) Approval Guide

B. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.

C. Sprinkler Occupancy Hazard Classifications, noted on plans by legend:

1. Building Service Areas: Ordinary Hazard, Group 1.
2. Electrical Equipment Rooms: Ordinary Hazard, Group 1.
3. Garages: Ordinary Hazard, Group 2.
4. General Storage Areas: Ordinary Hazard, Group 2.
5. Laundries: Ordinary Hazard, Group 1.
6. Office, IT, LAN Room and Public Areas: Light Hazard.
7. Residential Living Areas: Light Hazard.
8. Restaurant Service Areas: Ordinary Hazard, Group 1.

D. Minimum Density for Automatic-Sprinkler Piping Design:

1. Residential (Dwelling) Occupancy: 0.10 gpm over design area up to a maximum of four adjacent sprinklers, per NFPA 13.
2. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
3. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
4. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.

E. Maximum Protection Area per Sprinkler:

1. According to UL listing.
2. Residential Areas: 400 sq. ft.
3. Office Spaces: 225 sq. ft.
4. Storage Areas: 130 sq. ft.
5. Mechanical Equipment Rooms: 130 sq. ft.
6. Electrical Equipment Rooms: 130 sq. ft.
7. Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
8. Reductions in design area of operation without revising the density as permitted by NFPA 13 for Quick Response, Light or Ordinary Hazard, 20 ft. ceiling height and no unprotected ceiling pockets are permitted.

F. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

PART 2 - PRODUCTS

2.1 WATER SERVICE PIPE AND FITTINGS

A. Ductile-iron pipe and fittings for fire-suppression water-service-piping outside the building and underslab within the building.

1. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
2. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.
3. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end.
4. Grooved-End, Ductile-Iron Pipe Appurtenances:

a. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
b. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

5. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

6. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.
   a. Gaskets: AWWA C111, rubber.
   b. Flanges: ASME B16.1, Class 125, cast iron.

B. PE PIPE AND FITTING

1. PE, Fire-Service Pipe: FM Global approved, with minimum thickness equivalent to Class 150 and Class 200.

2. Molded PE Fittings: FM Global approved; PE butt-fusion type, made to match PE pipe dimensions and class.

C. PVC PIPE AND FITTINGS

1. PVC Pipe: AWWA C900 or UL 1285, Class 150 and Class 200, with bell end with gasket, and with spigot end.

2. PVC Fittings: AWWA C900 or UL 1285, Class 150 and Class 200, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.

D. CORROSION-PROTECTIVE ENCASEMENT FOR PIPING

1. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch (0.20-mm) minimum thickness, tube or sheet.

2.2 ABOVE GROUND PIPE AND FITTINGS

A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, with factory- or field-formed threaded ends.

1. Cast-Iron Threaded Flanges: ASME B16.1.

2. Malleable-Iron Threaded Fittings: ASME B16.3.

3. Gray-Iron Threaded Fittings: ASME B16.4.

4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe. Include ends matching joining method.

5. Steel Threaded Couplings: ASTM A 865.

B. Grooved-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, with factory- or field-formed, square-cut- or roll-grooved ends.

C. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anvil International.

2. Bullmoose.

3. Corcoran Piping System Co.

4. National Fittings, Inc.
5. Shurjoint Piping Products USA Inc.
6. Smith-Cooper International.
7. Tyco Fire Products LP.
8. Wheatland.

D. Grooved-Joint Piping Systems:

1. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
2. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
3. Victaulic FireLock™ Installation-Ready™ Rigid Couplings Style 009V, Style 009N and Style 109: UL-listed, ASTM A 536, Grade 65-45-12.

E. Grooved-End, Schedule 10 Steel Pipe: ASTM A 135 or ASTM A 795, Schedule 10 in NPS 5 (DN 125) and smaller; and NFPA 13-specified wall thickness in NPS 6 to NPS 10 (DN 150 to DN 250); with factory- or field-formed, roll-grooved ends.

F. Grooved-Joint Piping Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anvil International.
   b. Corcoran Piping System Co.
   c. National Fittings, Inc.
   d. Shurjoint Piping Products USA Inc.
   e. Smith-Cooper International.
   f. Tyco Fire Products LP.
   g. Victaulic Company.
2. Grooved-End Fittings: UL-listed, ASTM A 536, ductile-iron casting with OD matching steel-pipe OD.
3. Grooved-End-Pipe Couplings: UL 213 and AWWA C606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe OD. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, prelubricated rubber gasket listed for use with housing, and steel bolts and nuts.
4. Victaulic FireLock™ Installation-Ready™ Rigid Couplings Style 009V, Style 009N and Style 109: UL-listed, ASTM A 536, Grade 65-45-12.

G. Steel Pressure-Seal Fittings: UL 213, FM Global-approved, 175-psig (1200-kPa) pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. ASC Engineered Solutions
   b. Victaulic Company
2. Type 304 or 316 stainless steel, pressures up to 500 psi.
3. Elbows, Tees, End Caps and Adapters to match stainless steel type.

H. Welding branch Outlet Fittings by ASC Engineered Solutions Weld-Miser Tee-Let ASTM A53, Grades A or B, Type E. Threads are NFP per ASME B1.20.1 or ISO 7/1 Taper as ordered. Use for Schedule 40 or 10.

I. Victaulic FireLock™ IGS Groove System for Carbon Steel Pipe - In lieu of threaded steel piping systems, the Victaulic FireLock IGS System with "Installation-Ready™ fittings and couplings may be used for NPS 1 (DN 25) Schedule 10 and Schedule 40 carbon steel pipe in fire protection applications. System rated for a working pressure to 365 psi (2517 kPa).

1. Groove: IGS "Innovative Groove System" groove with shortened "A" dimension and tapered groove backside for ease of installation.
   a. Grooving Tool: Victaulic RG2100, with IGS Confirmation Gauge.
2. Fittings:
   a. Ductile iron housing conforming to ASTM A-536, Grade 65-45-12. Orange enamel coated or galvanized.
      1) Victaulic Style 101 (90-degree elbow), Style 102 (tee), and Style 108 (coupling) with Installation-Ready™ ends.
      2) Style 108 single-bolt coupling provided with EPDM Type A pressure responsive gasket with Vic-Plus lubricant, and ASTM A449 compliant electroplated steel bolt and nut. CrMo alloy steel coupling linkage.
   b. Thread x Groove adapter fittings and welded outlets with IGS grooved end, ASTM A53, grade A.

2.3 BACKFLOW PREVENTERS

A. Double-Check Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Ames Fire & Waterworks; a WATTS Brand
   b. Apollo Flow Controls; Conbraco Industries, Inc.
   c. Febco; A WATTS Brand
   d. Mueller Co
   e. WATTS
   f. Zurn Industries, LLC
2. Standard: ASSE 1015 or AWWA C510.
3. Operation: Continuous-pressure applications unless otherwise indicated.
4. Pressure Loss: 5 psig maximum, through middle one-third of flow range.
5. Size: 6"
6. Body Material: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved, steel with interior lining complying with AWWA C550 or that is FDA approved, or stainless steel for NPS 2-1/2 (DN 65) and larger.
7. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
8. Configuration: Designed for horizontal, straight through flow.
9. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.

B. Double-Check, Detector-Assembly Backflow Preventers:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Ames Fire & Waterworks; a WATTS Brand
   b. Apollo Flow Controls; Conbraco Industries, Inc.
   c. Febco; A WATTS Brand
   d. Mueller Co
   e. WATTS
   f. Zurn Industries, LLC
2. Standards: ASSE 1048 and UL's "Fire Protection Equipment Directory" listing or FM Global's "Approval Guide."
3. Operation: Continuous-pressure applications.
4. Body Material: Cast iron with interior lining complying with AWWA C550 or that is FDA approved Steel with interior lining complying with AWWA C550 or that is FDA approved Stainless steel.
5. End Connections: Flanged.
6. Configuration: Designed for horizontal, straight through vertical inlet, horizontal center section, or vertical outlet vertical flow.
7. Accessories:
   a. Valves: UL 262 and FM Global's "Approval Guide" listing; OS&Y gate type with flanged ends on inlet and outlet.
   b. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

C. Backflow Preventer Test Kits:
1. Description: Factory calibrated, with gauges, fittings, hoses, and carrying case with test-procedure instructions.

2.4 LISTED FIRE-PROTECTION VALVES

A. Valves shall be UL listed or FMG approved, with 175-psig (1200 kPa) minimum pressure rating. Valves shall have 250-psig (1725-kPa) minimum pressure rating if valves are components of high-pressure piping system.

B. Ball Valves: Comply with UL 1091, except with ball instead of disc.
1. NPS 1-1/2 (DN 40) and Smaller: Bronze or brass body with threaded or grooved ends. Basis of Design: Victaulic Series 728.
2. NPS 2 and NPS 2-1/2 (DN 50 and DN 65): Bronze body with threaded ends or ductile-iron body with grooved ends.
3. NPS 3 (DN 80): Ductile-iron body with grooved ends.

C. Butterfly Valves: UL 1091.
1. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
2. NPS 2-1/2 (DN 65) and Larger: Bronze, cast-iron, or ductile-iron body; wafer type or with flanged or grooved ends, pressure-responsive seat, and stem offset from the disc centerline to provide complete 360-degree circumferential seating. Basis of Design: Victaulic Series 705. Alternatively, Reliable RBV Bronze Butterfly Valves with tamper switches: 1”-2-1/2” threaded or 1-1/4” -2-1/2” grooved, 300 psi rating.

D. Check Valves NPS 2 (DN 50) and Larger: UL 312, swing type, cast-iron body with flanged or grooved ends.

E. Gate Valves: UL 262, OS&Y type.

1. NPS 2 (DN 50) and Smaller:
   a. Bronze body with threaded ends.
   b. Available Manufacturers:
      1) Crane Co.; Crane Valve Group; Crane Valves.
      2) Hammond Valve.
      3) NIBCO.
      4) United Brass Works, Inc.

2. NPS 2-1/2 (DN 65) and Larger:
   a. Cast or ductile-iron body with flanged or grooved ends. Basis of Design: Victaulic Series 771.
   b. Available Manufacturers:
      1) Clow Valve Co.
      2) Crane Co.; Crane Valve Group; Crane Valves.
      3) Crane Co.; Crane Valve Group; Jenkins Valves.
      4) Hammond Valve.
      5) Milwaukee Valve Company.
      6) Mueller Company.
      7) NIBCO.
      8) Red-White Valve Corp.
      9) United Brass Works, Inc.

2.5 Indicating Valves

A. UL 1091, with integral indicating device and ends matching connecting piping.

B. Indicator: Electrical, 125-V ac, prewired, single-circuit, supervisory switch or Electrical, 115-V ac, prewired, 2-circuit, supervisory switch.

C. NPS 2 (DN 50) and Smaller: Ball or butterfly valve with brass or bronze body and grooved or threaded ends. Basis of Design: Victaulic Series 728.

D. NPS 2-1/2 (DN 65) and Larger: Butterfly valve with cast- or ductile-iron body; wafer type or with flanged or grooved ends, pressure-responsive seat, and stem offset from the disc centerline to provide complete 360-degree circumferential seating. Basis of Design: Victaulic Series 705.

2.6 Automatic (Ball Drip) Drain Valves

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Reliable Automatic Sprinkler Co., Inc. (The).
2. Tyco Fire Products LP.

B. Standard: UL 1726.

C. Pressure Rating: 175-psig minimum.

D. Type: Automatic draining, ball check.

E. Size: NPS 3/4 (DN 20).

F. End Connections: Threaded.

2.7 Universal Manifold Check Assembly

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. Victaulic Fire Sprinkler Corp.

B. Basis of Design: Model UMC.

C. Standard: UL Listed and FM Approved.

D. Pressure Rating: Universal manifold check valve shall be rated for use at the maximum service pressure of 300 psi.

E. Type: Horizontal or Vertical installation.

F. Body Material: Ductile iron construction, incorporating a control valve, check valve, flow switch, test & drain assembly, adjustable relief valve, and system gauges in one compact body/footprint, and shall be manufactured for “right” and “left”-hand orientations. The test & drain assembly shall contain an adjustable relief valve, with a range of 175 to 310 psi.

G. End Connections: Threaded or Grooved.

2.8 Universal Manifold Assembly

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. Victaulic Fire Sprinkler Corp.

B. Basis of Design: Model UM.

C. Standard: UL Listed and FM Approved.

D. Pressure Rating: Universal manifold check valve shall be rated for use at the maximum service pressure of 300 psi.

E. Type: Horizontal or Vertical installation.

F. Body Material: Ductile iron construction, incorporating a control valve, flow switch, test & drain assembly, adjustable relief valve, and system gauges in one compact body/footprint, and shall be manufactured for “right” and “left”-hand orientations. The test & drain assemble shall contain an adjustable relief valve, with a range of 175 to 310 psi.

G. End Connections: Threaded or Grooved

2.9 Unlisted General-Duty Valves

A. Ball Valves NPS 2 (DN 50) and Smaller: MSS SP-110, 2-piece copper-alloy body with chrome-plated brass ball, 600-psig minimum CWP rating, blowout-proof stem, and threaded ends.

B. Check Valves NPS 2 (DN 50) and Smaller: MSS SP-80, Type 4, Class 125 minimum, swing type with bronze body, nonmetallic disc, and threaded ends.

C. Gate Valves NPS 2 (DN 50) and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, solid wedge, and threaded ends.

D. Globe Valves NPS 2 (DN 50) and Smaller: MSS SP-80, Type 2, Class 125 minimum, with bronze body, nonmetallic disc, and threaded ends.

2.10 SPRINKLER PIPING SPECIALTIES

A. Branch Outlet Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Anvil International.
   b. National Fittings, Inc.
   c. Shurjoint Piping Products USA Inc.
   d. Tyco Fire Products LP.
   e. Victaulic Company.
2. Standard: UL 213.
3. Pressure Rating: 175-psig minimum.
4. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
5. Type: Mechanical-tee and -cross fittings.
6. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
7. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
8. Branch Outlets: Grooved, plain-end pipe, or threaded.

B. Flow Detection and Test Assemblies:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. AGF Manufacturing Inc.
   b. Reliable Automatic Sprinkler Co., Inc. (The).
   c. Tyco Fire Products LP.
   d. Victaulic Company.
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast-bronze or ductile-iron housing with orifice, sight glass, and integral test valve.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded or grooved.

C. Branch Line Testers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Elkhart Brass Mfg. Co., Inc.
   b. Fire-End & Croker Corporation.
   c. Potter Roemer LLC.
2. Standard: UL 199.
3. Pressure Rating: 175 psig
4. Body Material: Brass.
5. Size: Same as connected piping.

6. Inlet: Threaded.
7. Drain Outlet: Threaded and capped.
8. Branch Outlet: Threaded, for sprinkler.

D. Sprinkler Inspector's Test Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. AGF Manufacturing Inc.
   b. Triple R Specialty.
   c. Tyco Fire Products LP.
   d. Victaulic Company.
   e. Viking Corporation.
2. Standard: UL's "Fire Protection Equipment Directory" or FM Global's "Approval Guide."
3. Pressure Rating: 175-psig minimum.
4. Body Material: Cast- or ductile-iron housing with sight glass.
5. Size: Same as connected piping.
6. Inlet and Outlet: Threaded.

E. Adjustable Drop Nipples:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Aegis Technologies, Inc.
   b. CECA, LLC.
   c. Corcoran Piping System Co.
   d. Merit Manufacturing.
2. Standard: UL 1474.
3. Pressure Rating: 250-psig minimum.
4. Body Material: Steel pipe with EPDM-rubber O-ring seals.
5. Size: Same as connected piping.
6. Length: Adjustable.
7. Inlet and Outlet: Threaded.

F. Flexible Sprinkler Hose Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. FlexHead Industries, Inc.
   b. Victaulic Company Vic-Flex
2. Standard: UL 2443 and FM 1637.
3. Type: Fully stainless-steel flexible hose for connection to sprinkler, and with one-piece open-gate "Series AB1" bracket for connection to ceiling grid. Bracket to allow for installation before ceiling tile is in place. Basis of Design: Victaulic AH2 or AH2-CC.
4. Bend radius to 2 inch (53 mm) for proper installation in confined spaces.
5. Pressure Rating: 175-psig minimum.
6. Size: Same as connected piping, for sprinkler.

7. In lieu of rigid connections to dry sprinkler heads, a Victaulic VicFlex™ dry sprinkler, Model VS1 or VS2, may be used. The sprinkler shall provide a vertical or horizontal flexible connection with a bend radius to 2" and allow for up to 4 bends.

8. In lieu of rigid pipe offsets or return bends for sprinkler drops in wet systems in cold storage applications, the Victaulic VicFlex™ V33, V36, or V40 Dry Sprinkler with Integral AB6 Assembly may be used or the K17 dry sprinkler with the AB6 bracket and the GH1 flexible fittings.

G. Automatic Air Vent:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. AFG Manufacturing
   b. ECS Corrosion
   c. Metraflex Company
   d. Potter Signal
   e. United Fire Systems
   f. Victaulic Company

2. Standard: UL listed or FM approved.

3. One-piece isolation valve with forged brass body with 1" NPT isolation valve, with stainless steel 20 mesh strainer that purges air while filling a system.

4. Adjustable purge valve with hose connection, thread cap and lanyard.

5. Locate at remote and high point in wet pipe systems.

H. Auxiliary Drains (Drum drips, Condensate drains) shall be provided in accordance with NFPA 13 at all system low points for complete system drainage. Provide signage indicating all locations.

I. FLEXIBLE CONNECTORS

1. Flexible connectors shall have materials suitable for system fluid. Include 175-psig minimum working-pressure rating and ends according to the following:
   a. NPS 2 (DN 50) and Smaller: Threaded.
   b. NPS 2-1/2 (DN 65) and Larger: Flanged.
   c. Option for NPS 2-1/2 (DN 65) and Larger: Grooved for use with grooved-end-pipe couplings.

2. Available Manufacturers:
   a. Anamet Inc.
   b. Flex-Hose Co., Inc.
   c. Flexicraft Industries.
   d. Flex-Pression, Ltd.
   e. Flex-Weld, Inc.
   f. Hyspan Precision Products, Inc.
   g. Mercer Rubber Co.
   h. Metraflex, Inc.
   i. Proco Products, Inc.
   j. Unaflex Inc.

3. Bronze-Hose, Flexible Connectors: Corrugated, bronze, inner tubing covered with bronze wire braid. Include copper-tube ends or bronze flanged ends, braze welded to hose.

4. Stainless-Steel-Hose/Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include steel nipples or flanges, welded to hose.

5. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

2.11 SPRINKLERS

A. Sprinklers shall be UL listed or FMG approved, with 175-psig (1200-kPa) minimum pressure rating.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Reliable Automatic Sprinkler Co., Inc. (The).
2. Tyco Fire Products LP.
3. Venus Fire Protection Ltd.
4. Victaulic Company. (Basis of Design)
5. Viking Corporation.

C. Automatic Sprinklers: With heat-responsive element complying with the following:

1. UL 199, for nonresidential applications. (Victaulic Series FL-QR)
2. UL 1626, for residential applications. (Victaulic Series FL-RES)
3. Institutional Pendent and Horizontal Fire Sprinklers (TYCO TFP PH2/PH5 or TFP651).

D. Sprinkler Types and Categories: Nominal with NPT or grooved connection, nominal orifice and temperature classification suitable for hazard and occupancy per the requirements of NFPA.

1. Nominal 1/2-inch (12.7-mm) orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
2. 1/2 inch (12.7 mm), with discharge coefficient K between 5.3 and 5.8.
3. 17/32 inch (13.5 mm), with discharge coefficient K between 7.4 and 8.2.

E. Hazard Applications:

1. Light hazard applications to have quick response upright, pendent, sidewall, and concealed type sprinklers as required by NFPA 13. Basis of Design: Victaulic Series FL-QR
2. Ordinary hazard applications to have quick response upright, pendent, sidewall, and concealed type sprinklers as required by NFPA 13. Basis of Design: Victaulic Series FL-QR.
3. Extended coverage sprinklers to be installed per both the guidelines of NFPA and manufactures requirements. Basis of Design: Victaulic Series FL-ECLH or FL-ECOH
4. Residential sprinklers shall be installed per both the guidelines of NFPA and manufactures requirements. Basis of Design: Victaulic Series FL-RES
5. Dry sprinklers shall be installed in areas subject to freezing and sized, installed, and located per both the guidelines of NFPA and manufactures requirements. Basis of Design: Victaulic Series FL-QR/DRY or FL-SR/DRY or FL-DRY/VicFlex.

F. Standard Sprinkler types, features, and options as follows:

1. Concealed ceiling sprinklers, including cover plate.
2. Extended-coverage sprinklers.

3. Flush ceiling sprinklers, including escutcheon.
4. Institutional.
5. Pendent sprinklers.
6. Quick-response sprinklers.
7. Recessed sprinklers, including escutcheon.
8. Sidewall sprinklers.
9. Sidewall and pendent, dry-type sprinklers.
10. Upright sprinklers.

G. Sprinkler Finishes: Chrome plated, bronze, and painted. Provide corrosion-resistant fire sprinklers and escutcheons in all rooms subject to moisture including bathrooms, shower rooms, pool rooms and exterior areas.

H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.

1. Ceiling Mounting: Chrome-plated or white factory finish steel, one-piece, flat concealer plate, or, two-piece, with 1-inch vertical adjustment.
2. Sidewall Mounting: Chrome-plated steel, one piece, flat.

I. Sprinkler Guards:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Reliable Automatic Sprinkler Co., Inc. (The).
   b. Tyco Fire Products LP.
   c. Victaulic Company.
   d. Viking Corporation.
2. Standard: UL 199.
3. Type: Wire cage with fastening device for attaching to sprinkler.

J. Escutcheons and guards shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.

K. Wrenches shall be provided by the sprinkler manufacturer that directly engage the wrench boss cast in the sprinkler body.

2.12 FLUSH-TYPE FIRE-DEPARTMENT CONNECTION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Fire Supply.
2. Brooks Equipment Co., Inc.
3. Elkhart Brass Mfg. Co., Inc.
4. Guardian Fire Equipment.
5. Potter Roemer LLC.
6. Zurn Industries, LLC

B. Standard: UL 405.

C. Type: Exposed, projecting, for wall mounting.

D. Finish: Cast Rough Brass (Standard). Provide inlet, caps and wall plates in matching finish.

E. Pressure Rating: 175 psig minimum.

F. Body Material: Corrosion-resistant metal. cast or forged and extruded aluminum rated for 250 PSI.

G. Inlets:

1. Number of Inlets: Two. Match finish.

2. Threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, lugged swivel connections, and check devices or clappers.

3. Aluminum or brass threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, connections, check devices or clappers.

4. Caps: Lugged type, with gasket and chain. Match finish.

H. Escutcheon Plate:

I. Round, wall type. Match finish or Rough Brass.

J. Escutcheon Plate Marking: Similar to "AUTO SPKR."

2.13 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Fire Alarm Horn/Strobe device above fire department connection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Fire-Lite Alarms, Inc. a Honeywell International Company.
   b. Notifier
   c. Potter Roemer LLC.

2. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

3. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.
   a. Rated Light Output: 30 cd.
   b. Mounting: Wall mounted unless otherwise indicated.
   c. Flashing shall be in a temporal pattern.
   d. Strobe Leads: Factory connected to screw terminals.
   e. Mounting Faceplate: Factory finished, red.

C. Water-Flow Indicators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ADT Security Services, Inc.

b. Notifier
c. Potter Roemer LLC.
d. System Sensor
e. Viking Corporation
f. Watts

2. Standard: UL 346.

3. Water-Flow Detector: Electrically supervised.

4. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.

5. Type: Paddle operated.

6. Pressure Rating: 250 psig.

7. Design Installation: Horizontal or vertical.

D. Valve Supervisory Switches:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Fire-Lite Alarms, Inc.; a Honeywell Company
b. Potter Electric Signal Company.
c. System Sensor
d. Tyco by Johnson Controls
e. Viking Corporation

2. Standard: UL 346.

3. Type: Electrically supervised.

4. Components: Single-pole, double-throw switch with normally closed contacts.

5. Design: Signals that controlled valve is in other than fully open position.

E. PRESSURE GAUGES

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. AGF Manufacturing Inc.
b. AMETEK, Inc.
c. Ashcroft Inc.
d. Brecco Corporation.
e. WIKA Instrument Corporation.

2. Standard: UL 393.

3. Dial Size: 3-1/2- to 4-1/2-inch diameter.

4. Pressure Gauge Range: 0- to 250-psig minimum.

5. Label: Include "WATER" or “AIR/WATER” label on dial face.

PART 3 - EXECUTION

3.1 PREPARATION

A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.

B. Report test results promptly and in writing.

3.2 EARTHWORK

A. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.3 EXAMINATION

A. Perform assessment of internal condition of piping, in accordance with NFPA 25 for the purpose of inspecting for the presence of foreign organic and inorganic material.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.4 SERVICE-ENTRANCE PIPING

A. Connect sprinkler piping to water-service piping for service entrance to building.

B. Install shutoff valve, backflow preventer, pressure gauge, drain, and other accessories indicated at connection to water-service piping.

3.5 BACKFLOW PREVENTER INSTALLATION

A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.

B. Do not install bypass piping around backflow preventers.

3.6 PIPING SCHEDULE

A. Underground fire-suppression water-service piping NPS 4 (DN 100) and larger shall be one of the following:

1. Grooved-end, ductile-iron pipe; grooved-end, ductile-iron pipe appurtenances; and grooved joints.
2. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern or ductile-iron, compact-pattern fittings; glands, gaskets, and bolts; and gasketed joints.
3. Push-on-joint, ductile-iron pipe; push-on-joint, ductile-iron compact-pattern fittings; and gasketed joints.
4. PE, Class 150 Class 200, fire-service pipe; molded PE fittings; and heat-fusion joints.
5. PVC, Class 150 Class 200 pipe listed for fire-protection service; PVC fittings of same class as pipe; and gasketed joints.

B. Piping between Fire Department Connections and Check Valves: Standard-weight steel pipe with threaded ends, cast-iron threaded fittings, and threaded or grooved ends, grooved-end fittings, grooved-end-pipe couplings, and grooved joints. Or equal or better CRR.

C. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.

D. Standard-pressure, wet-pipe sprinkler system, NPS 2 (DN 50) and smaller, shall be:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

2. Schedule 10 or 40 Victaulic FireLock™, Innovative Groove System (IGS) with installation ready fittings and couplings may be used for NPS 1 (DN 25). System rated for working pressure to 365 psi (2517 kPa).

E. Standard-pressure, wet-pipe sprinkler system, NPS 1-1/2 and larger, shall be one of the following:

1. Standard-weight, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.

2. Schedule 10 black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.7 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated on approved working plans.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Architect before deviating from approved working plans.

2. Detailed shop drawings shall be submitted prior to fabrication and installation showing all coordination with architectural, mechanical and electrical components. Any work done prior to shop drawing approval shall be re-done at contractor cost.

3. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

B. Piping Standard:

1. Comply with NFPA 13 requirements for installation of sprinkler piping.

2. Install underground service-entrance piping according to NFPA 24 and with restrained joints. Encase piping in corrosion-protective encasement.

C. Install seismic restraints on piping. Comply with NFPA 13 requirements for seismic-restraint device materials and installation.

D. All piping shall be concealed above ceiling, in walls or soffits and coordinated with the architectural plans. Install any allowed, exposed piping parallel with building structural and architectural elements, and coordinated (in-line with) light fixtures and diffusers. Piping in exposed locations shall be painted to match the color of the ceiling/roof structure above. Exposed piping shall be installed on a single plane, as high as possible to structure without vertical offsets as much as possible.

E. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

F. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

G. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

H. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.

I. Install sprinkler piping with drains for complete system drainage. Provide auxiliary drains per NFPA 13 for all piping offsets and trapped sections of pipe.

J. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.

K. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.

L. Install alarm devices in piping systems.

M. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.

N. Install pressure gauges on riser or feed main and at each sprinkler test connection. Include pressure gauges with connection not less than NPS 1/4 (DN 8) and with soft-metal seated globe valve, arranged for draining pipe between gauge and valve. Install gauges to permit removal and install where they are not subject to freezing.

O. Fill wet-pipe sprinkler system piping with water.

P. Install sleeves for piping penetrations of walls, ceilings, and floors.

Q. Install sleeve seals for piping penetrations of concrete walls and slabs.

R. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.8 JOINT CONSTRUCTION

A. Refer to Division 21 Section "Common Work Results for Fire Suppression" for basic piping joint construction.

B. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

C. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

D. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

E. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

F. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

G. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

H. 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:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

I. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.

J. Steel-Piping, Pressure-Sealed Joints: Join light wall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturers.

K. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

L. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble joints with listed coupling and gasket, lubricant, and bolts in accordance with the manufacturer's latest published instructions.

1. Gaskets shall be molded and produced by the grooved coupling manufacturer.

2. Grooved coupling manufacturer's factory trained field representative shall provide on-site training for contractor's field personnel in the proper use of grooving tools, application of grooving, and installation of grooved piping products. The factory trained representative shall periodically visit the jobsite to ensure best practices in grooved product installation are being followed. Contractor shall remove and replace any improperly installed products

M. Pressure-Sealed Joints: Use UL-listed tool and procedure. Include use of specific equipment, pressure-sealing tools, and accessories.

N. Dissimilar-Metal Piping Joints: Construct joints using dielectric fittings compatible with both piping materials.

1. NPS 2 (DN 50) and Smaller: Use dielectric unions, couplings, or nipples.

2. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.

3. NPS 5 (DN 125) and Larger: Use dielectric flange insulation kits.

3.9 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

C. Specialty Valves:

1. Install valves in vertical position for proper direction of flow, in main supply to system.

2. Install deluge valves in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gauges, priming chamber attachment, and fill-line attachment.

3. Auxiliary Drains (Drum drips, Condensate drains) shall be provided in accordance with NFPA 13 at all system low points for complete system drainage. Provide signage indicating all locations.

3.10 SPRINKLER SCHEDULE

A. Use sprinkler types in subparagraphs below for the following applications:

1. Rooms without Ceilings: Upright sprinklers.

2. Resident Rooms and spaces the residents can access with Suspended Ceilings: Institutional Style sprinklers.

3. Common and Office Rooms with Suspended Ceilings: Concealed sprinklers.

4. Wall Mounting: Sidewall sprinklers.

5. Spaces Subject to Freezing: Upright, pendent, dry sprinklers; and sidewall, dry sprinklers as indicated. Dry Flex Sprinklers (Victaulic VicFlex VS1); Cooler Flexible drop and bracket (Victaulic AB6)

6. Special Applications: Institutional space sprinklers.

B. Provide sprinkler types in subparagraphs below with finishes indicated.

1. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.

2. Flush Sprinklers: Bright chrome, with chrome escutcheon.

3. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.

4. Residential Sprinklers: White polyester with white polyester escutcheon.

5. Upright Pendent and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; natural brass, rough bronze in unfinished spaces not exposed to view; Painted to match ceiling surface in signal white, or jet black, wax coated where exposed to acids, chemicals, or other corrosive fumes.

3.11 SPRINKLER INSTALLATION

A. Install sprinklers in suspended ceilings in center of narrow dimension of acoustical ceiling panels.

B. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

C. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

D. Install corrosion resistant painted sprinklers and escutcheons in all areas subject to humidity, water use and corrosion – bathrooms, shower rooms, and laundry areas.

E. Do not install sprinklers that have been dropped, damaged, show a visible loss of fluid, or a cracked bulb.

F. The sprinkler bulb protector shall be removable by hand, without tools or devices that may damage the bulb.

3.12 FIRE-DEPARTMENT CONNECTION INSTALLATION

A. Install wall-type fire-department connections. Install wall-type fire-department connections 24” to 48” above finished grade.

B. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

C. Mount Fire Alarm Horn/Strobe device above fire department connection.

D. At the low point near each fire department connection, install a 90-degree elbow with drain connection to allow for localized system drainage to prevent freezing. Basis of Design: Victaulic #10-DR.

3.13 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Connect water-supply piping to fire-suppression piping. Include backflow preventer between potable-water piping and fire-suppression piping.

D. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.

E. Connect piping to specialty valves, hose valves, specialties, fire department connections, and accessories.

F. Electrical Connections: Power wiring is specified in Division 26.

G. Connect alarm devices to fire alarm.

H. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

I. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

J. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.14 LABELING AND IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.

B. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.15 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) and shall maintain that pressure without loss for 2 hours.
3. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.
6. Coordinate with fire-pump tests. Operate as required.
7. Verify that equipment hose threads are same as local fire department equipment.

B. Fire suppression piping system will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.16 CLEANING

A. Clean dirt and debris from sprinklers.

B. Only sprinklers with their original factory finish are acceptable. Remove and replace any sprinklers that are painted or have any other finish than their original factory finish.

C. Protect sprinklers from damage until Substantial Completion.

3.17 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain specialty valves. Refer to Division 01 Section "Demonstration and Training."

3.18 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Flush entire piping system of foreign matter.

D. Hydrostatically test entire system.

E. Require test be witnessed by Fire Marshal.

END OF SECTION 211300

SECTION 220517 - SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves.
2. Sleeve-seal systems.
3. Grout.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

2.2 SLEEVE-SEAL SYSTEMS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advance Products & Systems, Inc.
2. CALPICO, Inc.
3. Metraflex Company (The).
4. Pipeline Seal and Insulator, Inc.
5. Proco Products, Inc.

B. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.

1. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Carbon steel.
3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.3 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch annular clear space between piping and concrete slabs and walls.

1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Cut sleeves to length for mounting flush with both surfaces.
   a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.
2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.2 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.3 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:
   a. Piping Smaller Than NPS 6: Cast-iron wall sleeves or Galvanized-steel-pipe sleeves.
   b. Piping NPS 6 and Larger: Cast-iron wall sleeves or Galvanized-steel-pipe sleeves.

2. Exterior Concrete Walls below Grade:
   a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
   b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

3. Concrete Slabs-on-Grade:
   a. Piping Smaller Than NPS 6: Cast-iron wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.
   b. Piping NPS 6 and Larger: Cast-iron wall sleeves with sleeve-seal system or Galvanized-steel-pipe sleeves with sleeve-seal system.
      1) Select sleeve size to allow for 1-inch annular clear space between piping and sleeve for installing sleeve-seal system.

4. Concrete Slabs above Grade:
   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
   b. Piping NPS 6 and Larger: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
   c. PVC sleeves may NOT be used where exposed in plenums used for return air or where otherwise prohibited by code.

5. Interior Partitions:
   a. Piping Smaller Than NPS 6: Galvanized-steel-pipe sleeves or PVC-pipe sleeves.
   b. Piping NPS 6 and Larger: Galvanized-steel-sheet sleeves.

B. PVC Sleeves may NOT be used in plenum spaces used for air movement.

END OF SECTION 220517

SECTION 220518 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide Products of one of the following.

1. BrassCraft Manufacturing, a Masco Co.
2. Dearborn Brass
3. Jones Stephens Corp.

2.2 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated or rough-brass finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

D. Split-Plate, Stamped-Steel Type: With polished, chrome-plated finish; concealed or exposed-rivet] hinge; and spring-clip fasteners.

2.3 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. Escutcheons for New Piping [and Relocated Existing]:
   a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep pattern.

b. Chrome-Plated Piping: One-piece [steel] [cast brass][or split-casting brass] with polished, chrome-plated finish.
c. Insulated Piping: One-piece steel with [polished, chrome-plated] [polished brass] finish.
d. Insulated Piping: One-piece stamped steel [or split-plate, stamped steel with concealed hinge] [or split-plate, stamped steel with exposed-rivet hinge] with polished, chrome-plated finish.
e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece steel with [polished, chrome-plated] [polished brass] finish.
f. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece stamped steel [or split-plate, stamped steel with concealed hinge] [or split-plate, stamped steel with exposed-rivet hinge] with polished, chrome-plated finish.
g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece steel with [polished, chrome-plated] [polished brass] finish.
h. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece stamped steel [or split-plate, stamped steel with concealed hinge] [or split-plate, stamped steel with exposed-rivet hinge] with polished, chrome-plated finish.

2. Escutcheons for Existing Piping to Remain:
a. Chrome-Plated Piping: Split-casting, stamped steel with [concealed] [or] [exposed-rivet] hinge with polished, chrome-plated finish.
b. Insulated Piping: Split-plate, stamped steel with [concealed] [or] [exposed-rivet] hinge with polished, chrome-plated finish
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped steel with [concealed] [or] [exposed-rivet] hinge with polished, chrome-plated finish.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping [and] [existing relocated piping]: One-piece, floor-plate type.

3.2 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION 220518

SECTION 220519 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Thermowells.
3. Dial-type pressure gages.
4. Gage attachments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ashcroft Inc.
2. Ernst Flow Industries.
3. Marsh Bellofram.
4. Trerice, H. O. Co.
5. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
6. Weiss Instruments, Inc.

B. Standard: ASME B40.200.

C. Case: Liquid-filled and sealed type(s); stainless steel with 5-inch nominal diameter.

D. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F and deg C.

E. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.

F. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

G. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

H. Window: Plain glass or plastic.

I. Ring: Stainless steel.

J. Element: Bimetal coil.

K. Pointer: Dark-colored metal.

L. Accuracy: Plus or minus 1 percent of scale range.

2.2 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR or CUNI.
4. Material for Use with Steel Piping: CSA.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1, ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.3 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ashcroft Inc.
   b. Ernst Flow Industries.
   c. Marsh Bellofram.
   d. Trerice, H. O. Co.
   e. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   f. Weiss Instruments, Inc.
2.
3. Standard: ASME B40.100.

4. Case: Liquid-filled Sealed type(s); cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
5. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
6. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
7. Movement: Mechanical, with link to pressure element and connection to pointer.
8. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi and kPa.
9. Pointer: Dark-colored metal.
10. Window: Plain glass or plastic.
11. Ring: Stainless steel.
12. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.4 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass ball, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending a minimum of 2 inches into fluid or one-third of pipe diameter and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.

F. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.

G. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

H. Install remote-mounted pressure gages on panel.

I. Install valve and snubber in piping for each pressure gage for fluids.

J. Install thermometers in the following locations:
1. Inlet and outlet of each water heater.
2. Inlets and outlets of each domestic water heat exchanger.
3. Inlet and outlet of each domestic hot-water storage tank.

K. Install pressure gages in the following locations:

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.
4. Compound pressure gages are allowed.

L. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

M. Adjust faces of meters and gages to proper angle for best visibility.

3.2 THERMOMETER SCHEDULE

A. Thermometers at inlet and outlet of each domestic water heater shall be the following:

1. Liquid-filled Sealed, bimetallic-actuated type.
2. Metal case, industrial-style, liquid-in-glass type.

B. Thermometers at inlets and outlets of each domestic water heat exchanger shall be the following:

1. Liquid-filled Sealed, bimetallic-actuated type.
2. Metal case, industrial-style, liquid-in-glass type.

C. Thermometers at inlet and outlet of each domestic hot-water storage tank shall be the following:

1. Liquid-filled Sealed, bimetallic-actuated type.
2. Metal case, industrial-style, liquid-in-glass type.

D. Thermometer stems shall be of length to match thermowell insertion length.

3.3 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F and minus 20 to plus 50 deg C.

B. Scale Range for Domestic Hot-Water Piping: 20 to 240 deg F and 0 to 150 deg C.

3.4 PRESSURE-GAGE SCHEDULE

A. Pressure gages at discharge of each water service into building shall be the following:

1. Liquid-filled Sealed, direct-mounted, metal case.

B. Pressure gages at inlet and outlet of each water pressure-reducing valve shall be the following:

1. Liquid-filled Sealed, direct-mounted, metal case.
2. Test plug with EPDM self-sealing rubber inserts.

C. Pressure gages at suction and discharge of each domestic water pump shall be the following:

1. Liquid-filled Sealed, direct-mounted, metal case.
2. Test plug with EPDM self-sealing rubber inserts.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 160 psi and 0 to 1100 kPa.

B. Scale Range for Domestic Water Piping: 0 to 100 psi and 0 to 600 kPa.

END OF SECTION 220519

SECTION 220523 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ball valves.
2. Butterfly valves.
3. Check valves.
4. Chainwheels.

1.2 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene-diene terpolymer.

C. FKM: Fluoroelastomer.

D. NBR: Nitrile butadiene rubber (also known as Buna-N).

E. NRS: Nonrising stem.

F. OS&Y: Outside screw and yoke.

G. PTFE: Polytetrafluoroethylene.

H. RPTFE: Reinforced polytetrafluoroethylene.

I. RS: Rising stem.

1.3 ACTION SUBMITTALS

A. Product data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Standards:

1. Domestic-water piping valves intended to convey or dispense water for human consumption must comply with the U.S. Safe Drinking Water Act (SDWA), requirements of authorities having jurisdiction, and NSF 61/NSF 372; or to be certified in compliance with NSF 61/NSF 372 by an American National Standards Institute (ANSI)-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

B. ASME Compliance:

1. ASME B1.20.1 for threads for threaded-end valves.
2. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

3. ASME B16.18 for cast-copper solder-joint connections.
4. ASME B16.22 for wrought-copper solder-joint connections.
5. ASME B16.34 for flanged- and threaded-end connections.
6. ASME B16.51 for press joint connections.
7. ASME B31.9 for building services piping valves.

C. AWWA Compliance: Comply with AWWA C606 for grooved-end connections.

D. Provide bronze valves made with dezincification-resistant materials. Bronze valves made with copper alloy (brass) containing more than 15 percent zinc are unacceptable.

E. Valve Pressure-Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

F. Valve Sizes: Same as upstream piping unless otherwise indicated.

G. Valve Bypass and Drain Connections: MSS SP-45.

H. Valve Actuator Type:
1. Gear Actuator: For quarter-turn ball valves **NPS 4** and larger.
2. Hand Lever: For quarter-turn ball valves smaller than **NPS 4**.

I. Valves in Insulated Piping:
1. Provide 2-inch extended neck stems.
2. Provide extended operating handles with nonthermal-conductive covering material and protective sleeves that allow operation of valves without breaking vapor seals or disturbing insulation.

J. Manufacturers, including Ball, Butterfly and Check Valves:
1. Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.; Apollo Valves.
   b. Crane Co.; Crane Valve Group; Center Line.
   c. Crane Co.; Crane Valve Group; Jenkins Valves.
   d. Crane Co.; Crane Valve Group; Stockham Division.
   e. Hammond Valve.
   f. Milwaukee Valve Company.
   g. Mueller Steam Specialty; a division of SPX Corporation.
   h. NIBCO INC.
   i. Powell Valves.
   j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2.2 BALL VALVES, LEAD FREE

A. Ball Valves, Lead Free, Threaded or Soldered Ends - Bronze, **Two Piece** with **Full Port** and Bronze or Brass Trim:
1. Standards: MSS SP-110 and MSS SP-145.
2. CWP Rating: 600 psig.
3. Body Design: Two piece.
4. Body Material: Bronze.

5. Ends: Threaded or soldered. See Part 3 ball valve schedule articles.
6. Seats: PTFE.
7. Stem: Bronze or brass.
8. Ball: Chrome-plated brass.
9. Port: Full.

B. Ball Valves, Lead Free, Press Ends - Bronze, Two Piece with Full Port and Bronze or Brass Trim:

1. Standards: MSS SP-110, MSS SP-145, and IAPMO/ANSI Z1157.
2. CWP Rating: Minimum 200 psig.
3. Body Design: Two piece.
4. Body Material: Bronze.
5. Ends: Press.
6. Press-End Connections Rating: Minimum 200 psig.
7. Seats: PTFE or RTPFE.
8. Stem: Bronze or brass.
9. Ball: Chrome-plated brass.
10. Port: Full.
11. O-Ring Seal: EPDM or NBR.

C. Ball Valves, Lead Free, Threaded Ends - Bronze, Two Piece with Regular Port and Bronze or Brass Trim:

1. Standards: MSS SP-110 and MSS SP-145.
2. CWP Rating: 600 psig.
3. Body Design: Two piece.
4. Body Material: Bronze.
5. Ends: Threaded.
6. Seats: PTFE.
7. Stem: Bronze or brass.
8. Ball: Chrome-plated brass.
9. Port: Regular.

D. Ball Valves, Lead Free, Flanged or Threaded Ends - Steel, with Full Port, Class 150:

1. Standards: MSS SP-72 and MSS SP-110.
2. CWP Rating: 285 psig.
3. Body Design: Split body.
4. Body Material: Carbon steel, ASTM A216/A216M, Type WCB.
5. Ends: Flanged or threaded. See Part 3 ball valve schedule articles.
6. Seats: PTFE.
7. Stem: Stainless steel.

8. Ball: Stainless steel, vented.
9. Port: Full.

E. Ball Valves, Lead Free, Flanged or Threaded Ends - Iron, Class 125:

1. Standards: MSS SP-72, MSS SP-110, and MSS SP-145.
2. CWP Rating: 200 psig.
3. Body Design: Split body.
4. Body Material: ASTM A126, gray iron.
5. Ends: Flanged or threaded. See Part 3 ball valve schedule articles.
6. Seats: PTFE.
7. Stem: Stainless steel.
8. Ball: Stainless steel.
9. Port: Full.

2.3 BUTTERFLY VALVES, LEAD FREE

A. Butterfly Valves, Lead Free, Single Flange (Lug Type) - Iron, with Aluminum-Bronze Disc:

1. Standard: MSS SP-67, Type I.
2. CWP Rating: 150 psig, or 200 psig. See Part 3 butterfly valve schedule articles.
3. Body Design: Single flange (lug type), suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
4. Body Material: ASTM A126, cast iron or ASTM A536, ductile iron.
5. Seat: EPDM or NBR. See Part 3 butterfly valve schedule articles.
6. Stem: One- or two-piece stainless steel.
7. Disc: Aluminum bronze.

2.4 CHECK VALVES, LEAD FREE

A. Check Valves, Lead Free, Swing Type, Threaded or Soldered Ends - Bronze, with Bronze Disc, Class 125:

1. Standard: MSS SP-80, Type 3.
2. CWP Rating: 200 psig.
3. Body Design: Horizontal flow.
4. Body Material: ASTM B62, bronze.
5. Ends: Threaded or soldered. See Part 3 check valve schedule articles.
6. Disc: Bronze.

B. Check Valves, Lead Free, Swing Type, Threaded or Soldered Ends - Bronze, with Nonmetallic Disc, Class 125:

1. Standard: MSS SP-80, Type 4.
2. CWP Rating: 200 psig.
3. Body Design: Horizontal flow.

4. Body Material: ASTM B62, bronze.
5. Ends: Threaded or soldered. See Part 3 check valve schedule articles.
6. Disc: PTFE.

C. Check Valves, Lead Free, Swing Type, Press Ends:
1. Standards: MSS SP-80 and MSS SP-139.
2. CWP Rating: Minimum 200 psig.
3. Body Design: Horizontal flow.
4. Body Material: ASTM B584, bronze.
5. Ends: Press.
6. Press-End Connections Rating: Minimum 200 psig.
7. Disc: Brass or bronze.

D. Check Valves, Lead Free, Swing Type, Flanged or Threaded Ends - Iron, with Metal Seats, Class 125:
1. Standard: MSS SP-71, Type I.
2. CWP Rating: 200 psig.
3. Body Design: Clear or full waterway.
4. Body Material: ASTM A126, gray iron with bolted bonnet.
5. Ends: Flanged or threaded. .
6. Trim: Bronze.
7. Gasket: Asbestos free.

E. Check Valves, Lead Free, Swing Type, Flanged or Threaded Ends - Iron, with Nonmetallic-to-Metal Seats, Class 125:
1. Standard: MSS SP-71, Type I.
2. CWP Rating: 200 psig.
3. Body Design: Clear or full waterway.
4. Body Material: ASTM A126, gray iron with bolted bonnet.
5. Ends: Flanged or threaded. See Part 3 check valve schedule articles.
6. Trim: Composition.
7. Seat Ring: Bronze.
8. Disc Holder: Bronze.
9. Disc: PTFE.
10. Gasket: Asbestos free.

F. Check Valves, Lead Free, Swing Type, Grooved Ends - Iron, 300 CWP:
1. CWP Rating: 300 psig.
2. Body Material: ASTM A536, ductile iron.
3. Seat: EPDM.
4. Disc: Spring operated, ductile iron or stainless steel.

PART 3 - EXECUTION

3.1 INSTALLATION OF VALVES

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Provide support of piping adjacent to valves such that no force is imposed upon valves.

C. Locate valves for easy access and where not blocked by equipment, other piping, or building components.

D. For valves in horizontal piping, install valves with stem at or above center of pipe.

E. Install valves in position that does not project into aisles or block access to other equipment.

F. Install valves in position to allow full stem and actuator or manual operator movement.

G. Verify that joints of each valve have been properly installed and sealed to assure there is no leakage or damage.

H. Chainwheels: Install chainwheels on manual operators for **butterfly** and **globe**] valves NPS 4 and larger and more than **96 inches** above floor. Extend chains to **60 inches** above finished floor.

I. Install check valves for proper direction of flow and as follows:

1. Check Valves, Swing Type: In horizontal position with hinge pin level.

J. Valve Tags: Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.

K. Adhere to manufacturer's written installation instructions. When soldering or brazing valves, do not heat valves above maximum permitted temperature. Do not use solder with melting point temperature above valve manufacturer's written recommended maximum.

3.2 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valves with specified CWP ratings are unavailable, the same types of valves with higher CWP ratings may be substituted.

B. Select valves with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends except where solder-joint valve-end option or press-end option is indicated in valve schedules below.
2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends except where threaded valve-end option is indicated in valve schedules below.
3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
4. For Grooved-End Copper Tubing: Valve ends may be grooved.
5. For Grooved-End Steel Piping: Valve ends may be grooved.
6. Wafer-Type Valves: Flanged connections.

3.3 DOMESTIC HOT- AND COLD-WATER BALL VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Ball valves, lead free, press ends - brass, two piece with full port and brass trim.
2. Ball valves, lead free,- bronze, two piece with full port and bronze or brass trim; **threaded** or **soldered** ends.
3. Ball valves, lead free, press ends - bronze, two piece with full port and bronze or brass trim.

B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Ball valves, lead free, flanged or threaded ends - steel, with full port, Class 150; threaded ends.

3.4 DOMESTIC HOT- AND COLD-WATER BUTTERFLY VALVE SCHEDULE

A. Pipe NPS 2-1/2 (DN 65) and Larger shall be one of the folllowing:

1. Butterfly valves, lead free, single flange (lug type) - iron, with aluminum-bronze disc; 150 CWP, EPDM seat.
2. Butterfly valves, lead free, single flange (lug type) - iron, with ductile-iron disc; 150 CWP, EPDM seat.
3. Butterfly valves, lead free, grooved end - ductile iron, 175 CWP; EPDM seat.
4. Butterfly valves, lead free, grooved end - ductile iron, 300 CWP; EPDM seat.

3.5 DOMESTIC HOT- AND COLD-WATER CHECK VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Check valves, lead free, swing type, threaded or soldered ends - bronze, with bronze disc, Class 125; threaded or soldered ends.
2. Check valves, lead free, swing type, threaded or soldered ends - bronze, with nonmetallic disc, Class 125; threaded or soldered ends.
3. Check valves, lead free, swing type, threaded or soldered ends - bronze, with bronze disc, Class 150; threaded or soldered ends.
4. Check valves, lead free, swing type, threaded or soldered ends - bronze, with nonmetallic disc, Class 150; threaded or soldered ends.
5. Check valves, lead free, swing type, press ends - bronze.

3.6 PUMP-DISCHARGE CHECK VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Check valves, lead free, swing type, threaded or soldered ends - bronze, with bronze disc, Class 125; threaded or soldered ends.
2. Check valves, lead free, swing type, threaded or soldered ends - bronze, with nonmetallic disc, Class 125; threaded or soldered ends.
3. Check valves, lead free, swing type, threaded or soldered ends - bronze, with bronze disc, Class 150; threaded or soldered ends.
4. Check valves, lead free, swing type, threaded or soldered ends - bronze, with nonmetallic disc, Class 150; threaded or soldered ends.

B. Pipe NPS 2-1/2 (DN 65) and Larger for Sanitary Waste and Storm Drainage:

1. Check valves, swing type, flanged ends - iron, with lever- and spring-closure control, Class 125.

3.7 DOMESTIC HOT- AND COLD-WATER GATE VALVE SCHEDULE

A. Pipe NPS 2 (DN 50) and Smaller:

1. Gate valves, lead free, threaded or soldered ends - bronze, NRS, Class 125; threaded or soldered ends.
2. Gate valves, lead free, threaded ends - bronze, NRS, Class 150.
3. Gate valves, lead free, threaded ends - bronze, RS, Class 150.
4. Gate valves, lead free, press ends - bronze.

B. Pipe NPS 2-1/2 (DN 65) and Larger:

1. Gate valves, lead free, flanged ends - iron, NRS, Class 125.
2. Gate valves, lead free, flanged ends - iron, OS&Y, Class 125.
3. Gate valves, lead free, flanged ends - iron, NRS, Class 250.
4. Gate valves, lead free, flanged ends - iron, OS&Y, Class 250.

END OF SECTION 220523

SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe-positioning Systems.
6. Equipment supports.
7. Cable supports.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
2. Section 220516 "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Equipment supports.
3. Cable hangers

C. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

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

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design trapeze pipe hangers and equipment supports.

B. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

2.2 METAL PIPE HANGERS AND SUPPORTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Anvil
2. Cooper B-line
3. FNW
4. Gripple
5. Mason Industries
6. National

B. General Pipe Hanger Requirements:

1. Provide adjustable hangers, inserts, brackets, rolls, clamps, channels, rods, guides, anchors, flexible connectors, supplementary steel, etc., as required for proper support of all pipe lines as indicated on the contract documents or as required for a complete installation.
2. Provide accompanying attachments including bolts and nuts, sheetmetal screws or rivets suitable for application.
3. Trapeze may be used for support of multiple pipes. Cable hanger systems may be used at contractor option.
4. Hangers shall be designed to allow for expansion and contraction of pipe lines and shall be of adequate size to permit covering when required. Provide protective saddles and blocking where supporting insulated piping to prevent crushing insulation.

C. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, liner or felt liner.

4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.

5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

D. Copper Pipe and Tube Hangers:

1. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.

2. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel.

E. Pipe Hangers, supports and fasteners in corrosive environments shall be 304 stainless steel.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-58, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.4 CABLE PIPE HANGER SYSTEMS

A. Cable Hanger systems shall be a complete assembly including MSS SP-58 compliant components including slip and locking fasteners or clips, brackets, adjustment mechanisms and all upper and lower attachments.

B. Cables shall be constructed of wire rope, load rated tor each application. Cables may be used for individual pipe runs or multi-pipe trapeze applications.

2.5 THERMAL-HANGER SHIELD INSERTS

A. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

B. Insulation-Insert Material for Hot Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

C. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

D. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

E. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Upper Attachments

1. Upper attachments shall be manufactured items specific to the applicable structure.
   a. Include concrete inserts, wedge type drilled in inserts, steel beam and joist clamps, plates, rods, clips, straps and brackets as required by the application.
   b. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

c. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Aluminum: ASTM B221.

B. Carbon Steel: ASTM A1011/A1011M.

C. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

D. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation, for penetrations through fire-rated walls, ceilings, and assemblies.

B. Strength of Support Assemblies: Where not indicated, select sizes of components, so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

3.2 HANGER AND SUPPORT INSTALLATION

A. Hanger and support spacing shall meet maximum piping span length requirements for the sizes indicated.

B. Metal Pipe-Hanger Installation: Comply with MSS SP-58. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

C. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-58. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

D. Utilize copper clad, plastic coated or felt lined hangers where copper or plastic piping is subject to corrosion or abrasion from the hanger.

E. Cable System Hanger Installation: Follow all manufacturer installation instructions for a secure installation and complete. Provide necessary anchors, bracing to prevent excessive movement and sway of the piping system. Where required, provide transition to other hanger and support systems.

1. Cable pipe hanger systems may be used at contractor option.

F. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

G. Fastener System Installation:

1.

2. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than 4 inches thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.

3. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

H. Pipe-Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

I. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

J. Support each piping system independently with no piping bearing on another.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

M. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

N. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

O. Install piping NPS 4 and larger from top chord of steel joists only.

P. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

Q. Pipe Slopes: Install hangers and supports to provide indicated or required pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

R. Insulated Piping:

1. Attach clamps and spacers to piping.
   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not 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.

5. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting." Or Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.7 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-58 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports and metal trapeze pipe hangers and attachments for general service applications.

F. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

G. Use padded hangers for piping that is subject to scratching.

H. Use thermal-hanger shield inserts for insulated piping and tubing.

I. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 30.
2. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes NPS 3/4 to NPS 36, requiring clamp flexibility and up to 4 inches of insulation.
3. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.
4. Pipe Hangers (MSS Type 5): For suspension of pipes NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
5. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
6. Pipe Stanchion Saddles (MSS Type 37): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
7. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
8. Single-Pipe Rolls (MSS Type 41): For suspension of pipes NPS 1 to NPS 30, from two rods if longitudinal movement caused by expansion and contraction might occur.

9. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes NPS 2-1/2 to NPS 24, from single rod if horizontal movement caused by expansion and contraction occurs.

10. Complete Pipe Rolls (MSS Type 44): For support of pipes NPS 2 to NPS 42 if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.

11. Pipe Roll and Plate Units (MSS Type 45): For support of pipes NPS 2 to NPS 24 if small horizontal movement caused by expansion and contraction occurs and vertical adjustment is unnecessary.

12. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes NPS 2 to NPS 30 if vertical and lateral adjustment during installation, in addition to expansion and contraction, is required.

13. Cable System Hangers: For suspension of non-insulated or insulated, stationary pipes NPS 1/2 to NPS 8. Provide all system components including cables, slip and locking fasteners or clips, brackets, adjustment mechanisms and attachments as recommended by the manufacturer. Provide necessary anchors and bracing to prevent excessive movement and sway of the piping system.

J. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers NPS 3/4 to NPS 24 if longer ends are required for riser clamps.

K. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.

3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11 split pipe rings.

4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.

5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

L. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

6. C-Clamps (MSS Type 23): For structural shapes.

7. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
8. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
9. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
10. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
11. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
12. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
    a. Light (MSS Type 31): 750 lb.
    b. Medium (MSS Type 32): 1500 lb.
    c. Heavy (MSS Type 33): 3000 lb.
13. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
14. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
15. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

M. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

N. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
2. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches.
3. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
4. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
5. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
6. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
7. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load, and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.

8. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
    a. Horizontal (MSS Type 54): Mounted horizontally.
    b. Vertical (MSS Type 55): Mounted vertically.
    c. Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.

O. Comply with MSS SP-58 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

P. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 220529

SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Brady Corporation.
   b. Carlton Industries, LP.
   c. Champion America.
   d. Craftmark Pipe Markers.
   e. LEM Products Inc.
   f. Marking Services, Inc.
   g. Seton Identification Products.
2. Material and Thickness: Brass, 0.032-inch or aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
3. Letter Color: White.
4. Background Color: Blue.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.
7. Fasteners: Stainless-steel rivets or self-tapping screws.
8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Plastic Labels for Equipment:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Brady Corporation.
   b. Carlton Industries, LP.
   c. Champion America.
   d. Craftmark Pipe Markers.

e. LEM Products Inc.
f. Marking Services, Inc.
g. Seton Identification Products.

2. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

3. Letter Color: White.

4. Background Color: Blue.

5. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

6. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

7. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

8. Fasteners: Stainless-steel rivets or self-tapping screws.

9. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

C. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), and the Specification Section number and title where equipment is specified.

D. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number, and identify Drawing numbers where equipment is indicated (plans, details, and schedules) and the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.

2. Carlton Industries, LP.

3. Champion America.

4. Craftmark Pipe Markers.

5. LEM Products Inc.

6. Marking Sevices Inc.

7. Seton Identification Products.

B. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

C. Letter Color: White.

D. Background Color: Red.

E. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

F. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

G. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-quarters the size of principal lettering.

H. Fasteners: Stainless-steel rivets or self-tapping screws.

I. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

J. Label Content: Include caution and warning information plus emergency notification instructions.

2.3 PIPE LABELS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Brady Corporation.
2. Carlton Industries, LP.
3. Champion America.
4. Craftmark Pipe Markers.
5. LEM Products Inc.
6. Marking Sevices Inc.
7. Seton Identification Products.

B. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

C. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

D. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

E. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings; also include pipe size and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping-system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1/2 inch for viewing distances up to 72 inches and proportionately larger lettering for greater viewing distances.

PART 3 - EXECUTION

3.1 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.2 PIPE LABEL INSTALLATION

A. Piping Color Coding: Painting of piping is specified in Section 099123 "Interior Painting."

B. Pipe Label Locations: Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations and on both sides of through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Domestic Water Piping
   a. Background: Safety green.
   b. Letter Colors: White.
2. Sanitary Waste and Vent and Storm Drainage Piping:
   a. Background Color: Safety black.
   b. Letter Color: White.
3. Natural Gas Piping:
   a. Background Color: Safety Yellow
   b. Letter Color: Black.

END OF SECTION 220553

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic cold-water piping.
2. Domestic hot-water piping.
3. Domestic recirculating hot-water piping.
4. Domestic chilled-water piping for drinking fountains.
5. Sanitary waste piping exposed to freezing conditions.
6. Storm-water piping exposed to freezing conditions.
7. Roof drains and rainwater leaders.
8. Supplies and drains for handicap-accessible lavatories and sinks.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material test reports.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.

1.5 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.6 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products in accordance with ASTM E84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation, jacket materials, adhesive, mastic, tapes, and cement material containers with appropriate markings of applicable testing agency.

1. [All Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.]

2. [All Insulation Installed Indoors; Outdoors-Installed Insulation in Contact with Airstream: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.]

2.2 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. 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.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Flexible Elastomeric: Closed-cell or expanded-rubber materials; suitable for maximum use temperature between minus 70 deg F and 220 deg F. Comply with ASTM C534/C534M, Type I for tubular materials.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Armaflex
   b. Aeroflex
   c. Armacell
   d. K-flex

G. Glass-Fiber, Preformed Pipe: Glass fibers bonded with a thermosetting resin; suitable for maximum use **temperature up to 850 deg F** in accordance with ASTM C411. Comply with ASTM C547.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. Knauf Insulation.
   c. Manson Insulation Inc.
   d. Owens Corning.

2. Preformed Pipe Insulation: Type I, Grade A[, unfaced] [with factory-applied ASJ] [with factory-applied ASJ-SSL] [with factory-applied PSK jacket].

3. Fabricated shapes in accordance with ASTM C450 and ASTM C585.

4. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

2.3 INSULATING CEMENTS

A. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Ramco Insulation, Inc.

2.4 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Aeroflex USA, Inc.
   b. Armacell LLC.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. K-Flex USA.

C. Glass Fiber and Mineral Wool Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Mon-Eco Industries, Inc.

D. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Mon-Eco Industries, Inc.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Dow Corning Corporation.
   b. Johns Manville; a Berkshire Hathaway company.
   c. P.I.C. Plastics, Inc.
   d. Speedline Corporation.

2.5 MASTICS AND COATINGS

A. Materials shall be compatible with insulation materials, jackets, and substrates,

B. Vapor-Retarder Mastic: Water based; suitable for indoor use on below-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Foster Brand; H. B. Fuller Construction Products.
   c. Knauf Insulation.
   d. Vimasco Corporation.
2. Water-Vapor Permeance: Comply with ASTM E96/E96M or ASTM F1249..
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Knauf Insulation.
   e. Mon-Eco Industries, Inc.
   f. Vimasco Corporation.
2. Water-Vapor Permeance: ASTM E96/E96M, greater than 1.0 perm (0.66 metric perms) at manufacturer's recommended dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Color: White.

2.6 SEALANTS

A. Materials shall be as recommended by the insulation manufacturer and shall be compatible with insulation materials, jackets, and substrates.

B. Joint Sealants

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d. Mon-Eco Industries, Inc.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: **Minus 58 to plus 176 deg F**
4. Color: White or gray.

C. FSK and Metal Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
   d.
2. Fire- and water-resistant, flexible, elastomeric sealant.
3. Service Temperature Range: **Minus 40 to plus 250 deg F**.
4. Color: Aluminum.

D. ASJ Flashing Sealants, Vinyl and PVC Jacket Flashing Sealants:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Childers Brand; H. B. Fuller Construction Products.
   b. Eagle Bridges - Marathon Industries.
   c. Foster Brand; H. B. Fuller Construction Products.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: **Minus 40 to plus 250 deg F** (Minus 40 to plus 121 deg C).
5. Color: White.

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.

C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Johns Manville; a Berkshire Hathaway company.
   b. P.I.C. Plastics, Inc.
   c. Proto Corporation.
   d. Speedline Corporation.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.
4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

2.9 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Avery Dennison Corporation, Specialty Tapes Division.
   b. Compac Corporation.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
   e. Venture Tape.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Avery Dennison Corporation, Specialty Tapes Division.
   b. Compac Corporation.
   c. Ideal Tape Co., Inc., an American Biltrite Company.
   d. Knauf Insulation.
   e. Venture Tape.

2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Compac Corporation.
   b. Ideal Tape Co., Inc., an American Biltrite Company.
   c. Venture Tape.
2. Width: 2 inches.
3. Thickness: 6 mils.
4. Adhesion: 64 ounces force/inch in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch in width.

2.10 SECUREMENTS

A. Aluminum Bands: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing seal or closed seal.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ITW Insulation Systems; Illinois Tool Works, Inc.
   b. RPR Products, Inc.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch-wide, stainless steel or Monel.

C. Wire: 0.080-inch nickel-copper alloy 0.062-inch or soft-annealed, stainless steel.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. C & F Wire.

2.11 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers, **refer to plumbing fixture schedule**:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Buckaroos, Inc.
   b. Engineered Brass Company.
   c. Insul-Tect Products Co.
   d. McGuire Manufacturing.
   e. Plumberex Specialty Products, Inc.
   f. Truebro.
   g. Zurn Industries, LLC.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing. Replace insulation materials that get wet during storage or in the installation process before being properly covered and sealed in accordance with the contract documents

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch-wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.
   a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.

2. Testing agency labels and stamps.

3. Nameplates and data plates.

4. Cleanouts.

3.3 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.

4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).

4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

2. Seal penetrations through fire-rated assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.4 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, Mechanical Couplings, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve

stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges, mechanical couplings, and unions, using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than 2 times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Stencil or label the outside insulation jacket of each union with the word "union" matching size and color of pipe labels

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.6 INSTALLATION OF GLASS-FIBER AND MINERAL WOOL INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands, and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches o.c.
4. For insulation with jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive, as recommended by insulation material manufacturer, and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install prefabricated pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with glass-fiber or mineral-wool blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.

2. When prefabricated insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install prefabricated sections of same material as that of straight segments of pipe insulation when available.

2. When prefabricated sections are not available, install fabricated sections of pipe insulation to valve body.

3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

4. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FIELD-APPLIED JACKETS

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch overlap at seams and joints.

2. Embed glass cloth between two 0.062-inch-thick coats of lagging adhesive.

3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.

2. Install lap or joint strips with same material as jacket.

3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch laps at longitudinal seams and 3-inch-wide joint strips at end joints.

5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless steel bands 12 inches o.c. and at end joints.

3.8 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
   a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.10 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.
2. Underground piping.
3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.11 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water: Insulation shall be one of the following:

1. Flexible Elastomeric: 1/2 inch thick.
2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

B. Domestic Cold Water: Insulation shall be one of the following:

1. Flexible Elastomeric.
2. Mineral-Fiber, Preformed Pipe Insulation, Type I.

3. Provide Uniform Plumbing Code compliant insulation:
    a. 2018 UPC Hot water and hot water recirculating pipe insulation:
    b. All temperatures –
    Thickness matching pipe diameter - (pipe sizes less than 2")
    2" insulation (Pipe sizes 2" and above.)

C. Stormwater and Overflow: Insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch thick.

2. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

D. Roof Drain and Overflow Drain Bodies: Insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch thick.

2. Mineral-Fiber, Type I: 2 inch thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities: Insulation shall be:

1. Refer to plumbing fixture schedule.

F. Plumbing vents within six linear feet of roof outlet: Insulation shall be one of the following:

1. Flexible Elastomeric: 1 inch thick.

2. Mineral-Fiber, Type I: 2 inch thick.

END OF SECTION 220719

SECTION 22 11 13
FACILITY WATER DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. Missouri American Water, Water Pipeline Technical Specifications, Current Edition.

1.2 SUMMARY

A. This Section includes water-distribution piping and related components outside the building for water service and fire-service mains. All private and public work shall be in accordance with Missouri American Water, Water Pipeline Technical Specifications.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
   2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
   3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.

D. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.

E. NSF Compliance:
   1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.5 DELIVERY, STORAGE, AND HANDLING

A. All delivery, storage, and handling of materials shall comply with manufacturer’s recommendations. In general:

B. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
   1. Ensure that valves are dry and internally protected against rust and corrosion.
   2. Protect valves against damage to threaded ends and flange faces.
   3. Set valves in best position for handling. Set valves closed to prevent rattling.

C. During Storage: Use precautions for valves, including fire hydrants, according to the following:
   1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
   2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

D. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

E. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.

F. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

G. Protect flanges, fittings, and specialties from moisture and dirt.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service:
   1. Coordinate with Missouri American Water 48 hours in advance.

PART 2 - PRODUCTS

2.1 CLASS 50 DUCTILE IRON PIPE (DIP) AND FITTINGS FOR WATER LINES (6" AND LARGER). CLASS 51 DUCTILE IRON PIPE (DIP) FOR 3 AND 4" WATER LINES.

A. Comply with Missouri American Water Specifications.

2.2 PRESSURE CLASS 235 POLYVINYL CHLORIDE PIPE (PVC C900) AND FITTINGS FOR WATER LINES (4" AND LARGER).

A. Comply with Missouri American Water Specifications.

2.3 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE FOR DOMESTIC SERVICE LINES

A. Comply with Missouri American Water Specifications.

2.4 SOFT TYPE "K" COPPER CONFORMING TO ASTM B88 FOR DOMESTIC SERVICE LINES (2" AND SMALLER).

2.5 VALVES

A. Comply with Missouri American Water Specifications.

2.6 VALVE ACCESSORIES AND SPECIALTIES

A. Tapping Sleeves and Valves:
   1. Comply with Missouri American Water Specifications.

B. Valve Boxes:
   1. Comply with Missouri American Water Specifications.

C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.

2.7 FIRE HYDRANTS

A. Refer to the Missouri American Water Specifications. All fire hydrant branches shall be restrained using approved restraining devices. Hydrants shall be installed so that the centerline of the outlet nozzle is between eighteen inches above finished grade, and so that there is a minimum clear area of 5' in each direction to allow operation of the hydrant. All fire hydrants are to be set with the base 2" to 6” above the top of curb or grade. Fire hydrants shall be painted as required by Missouri American Water Specifications.

2.8 BACKFLOW PREVENTION DEVICES

A. An MDNR approved Backflow Prevention Device shall be provided.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Refer to Missouri American Water Specifications for excavating, trenching, and backfilling.

3.2 PIPING APPLICATIONS

A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.

B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.

C. Do not use flanges or unions for underground piping.

D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.

E. Underground Fire Protection Line Piping to building shall be in accordance with Missouri American Water Specifications. Subject to restrictions based on the State’s currently adopted Fire Code.

3.3 VALVE APPLICATIONS

A. General Application: All joints shall be restrained. Use mechanical-joint-end valves for 3” and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for 2” and smaller installation.

B. Drawings indicate valve types to be used. Where specific valve types are not indicated, valves shall comply with Missouri American Water Specifications.

3.4 PIPING INSTALLATION

1. Comply with Missouri American Water Specifications.

B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.

C. Bury piping with depth of cover over top at least 42 inches.

D. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.

E. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
   1. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.

F. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

3.5 ANCHORAGE INSTALLATION

A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
   1. Concrete thrust blocks.
   2. Comply with Missouri American Water Specifications for restrained joints for various pipe materials.

B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches.

C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

3.6 VALVE, FITTINGS AND HYDRANT INSTALLATION

A. Comply with Missouri American Water Specifications.

3.7 WATER METER INSTALLATION

A. Install water meters, piping, and specialties according to the Missouri American Water written instructions.

3.8 ROUGHING-IN FOR BACK FLOW PREVENTERS AND WATER METERS

A. Rough-in piping and specialties for back flow preventers and water meter installation according to utility company's written instructions.

3.9 CONNECTIONS AND ABANDONMENT

A. Connect water-distribution piping to existing water main. Reference to the Missouri American Water Specifications.

B. Connect water-distribution piping to interior domestic water and fire-suppression piping as applicable.

C. Water Utilities within the 5’ of the proposed building addition or with conflict of other utilities or improvements shall be removed.

3.10 CONCRETE VAULT AND METER PIT INSTALLATION

A. Install precast concrete vaults according to Missouri American Water Specifications. Set lids flush with grade if located in sidewalks, 1” above grade if located in lawn areas.

3.11 FIELD QUALITY CONTROL

A. Hydrostatic pressure and leakage testing shall be performed by the contractor in accordance with the Missouri American Water Specifications.

3.12 IDENTIFICATION

A. Install continuous underground detectable warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Section 312000 "Earth Moving."

3.13 CLEANING

A. Clean and disinfect water-distribution piping in accordance with Missouri American Water Specifications.

END OF SECTION 22 11 13

SECTION 221114 - FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, tubes, and fittings.
2. Piping specialties.
3. Joining materials.
4. Valves.
5. Pressure regulators.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Piping specialties.
2. Corrugated, stainless steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Pressure regulators. Indicate pressure ratings and capacities.
5. Service meters. Indicate capacities. Include bypass fittings, supports.
6. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1. Detail mounting, supports, and valve arrangements for service-meter assembly and pressure regulator assembly.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.

B. Certificates:

1. Welding certificates.

C. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.

D. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1. Steel Support Welding: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M, "Structural Welding Code - Steel."

2. Pipe Welding: Qualify procedures and operators in accordance with the ASME Boiler and Pressure Vessel Code.

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.

1.6 PROJECT CONDITIONS

A. Reference data from project civil engineer of record for existing gas service location and characteristics. Contact utility as required for additional information, including gas pressures and meter arrangements allowed.

1.7 COORDINATION

A. Coordinate requirements for access panels and doors for valves installed and concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

B. Coordinate requirements for piping identification for natural-gas piping. Comply with requirements in Section 220553 "Identification of Plumbing Piping and Equipment."

1.8 DEFINITIONS

A. 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, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.9 PERFORMANCE REQUIREMENTS

A. Comply with the International Fuel Gas Code.

B. Minimum Operating-Pressure Ratings:

1. Piping and Valves: 100 psig minimum unless otherwise indicated.

2. Service Regulators: 65 psig minimum unless otherwise indicated.

3. Minimum Operating Pressure of Service Meter: 5 psig.

C. Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than 0.5 psig but not more than 2 psig, and is reduced to secondary pressure of 0.5 psig or less.

1.10 ACTION SUBMITTALS

A. Product Data: For each type of the following:

1. Piping specialties.
2. Corrugated, stainless-steel tubing with associated components.
3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
4. Piping and fittings.
5. Pressure regulators. Indicate pressure ratings and capacities.
6. Dielectric fittings.

B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.

B. 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.

C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.

1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
2. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
3. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
4. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
    a. Material Group: 1.1.
    b. End Connections: Threaded or butt welding to match pipe.
    c. Lapped Face: Not permitted underground.
    d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
    e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.

5. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
    a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
6. Mechanical Couplings:
    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        1) Dresser Piping Specialties; Division of Dresser, Inc.
        2) Smith-Blair, Inc.
        3) Viega
    b. Steel flanges and tube with epoxy finish.
    c. Buna-nitrile seals.
    d. Steel bolts, washers, and nuts.
    e. Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
    f. Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.

B. Pressure Seal Piping Systems

1. Manufacturers
    a. Viega
    b. Apollo
    c.
2. Pipe: Carbon steel pipe shall conform to ASTM A53, A106, A135 or A795. Pipe schedule (pipe wall thickness) shall conform to the standard referenced dimensions for Schedule 5 to 40.
3. Fittings: Cold Press Mechanical Joint Fitting material shall match and be compatible with the piping material. Fittings shall conform to material requirements of ASTM A420 or ASME B16.3 and performance criteria of IAPMO PS117 and ASTM F3226. Sealing elements for press fittings shall be leak free. Sealing elements shall be factory installed or an alternative supplied by fitting manufacturer. Press ends shall have Smart Connect® technology design (leakage path). Press fittings with the Smart Connect technology assure leakage of liquids and/or gases from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.
    a. Gaskets: Sizes up thru 2” – EPDM. Viega MEGAPRESS or equal.
    b. Gaskets: Sizes 2-1/2” thru 4” – FKM. Viega MEGARPESS S or equal.
    c. Gaskets: Sizes 201/2” thru 4” – FKM extra thick, Viega MEGAPRESS S XL.
4. Pipe Thread: Pipe Threads shall conform to ASTM B1.20.1.
5. Hangers and supports: Hangers and supports shall conform to MSS SP 58.
    a. Hanger spacing: In accordance with ASME B 31.1, NFPA54, UPC, IMC and all National or local codes.

C. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1/CSA 6.26..

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. OmegaFlex, Inc.
    b. Parker Hannifin Corporation; Parflex Division.
    c. Titeflex.
    d. Tru-Flex Metal Hose Corp.

2. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
3. Coating: PE with flame retardant.
   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: 50 or less.
4. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
5. Striker Plates: Steel, designed to protect tubing from penetrations.
6. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
7. Operating-Pressure Rating: 5 psig.

D. PE Pipe: ASTM D 2513, SDR 11.

1. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
2. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
3. Anodeless Service-Line Risers: Factory fabricated and leak tested.
   a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
   b. Casing: Steel pipe complying with ASTM A 53/A 53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering.
   c. Aboveground Portion: PE transition fitting.
   d. Outlet shall be threaded or flanged or suitable for welded connection.
   e. Tracer wire connection.
   f. Ultraviolet shield.
   g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
4. Transition Service-Line Risers: Factory fabricated and leak tested.
   a. Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
   b. Outlet shall be threaded or flanged or suitable for welded connection.
   c. Bridging sleeve over mechanical coupling.
   d. Factory-connected anode.
   e. Tracer wire connection.
   f. Ultraviolet shield.
   g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
5. Plastic Mechanical Couplings, NPS 1-1/2 and Smaller: Capable of joining PE pipe to PE pipe.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Lyall, R. W. & Company, Inc.
      2) Mueller Co.; Gas Products Div.
      3) Perfection Corporation; a subsidiary of American Meter Company.
   b. PE body with molded-in, stainless-steel support ring.

c. Buna-nitrile seals.
d. Acetal collets.
e. Electro-zinc-plated steel stiffener.

6. Plastic Mechanical Couplings, NPS 2 and Larger: Capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Lyall, R. W. & Company, Inc.
      2) Mueller Co.; Gas Products Div.
      3) Perfection Corporation; a subsidiary of American Meter Company.
   b. Fiber-reinforced plastic body.
   c. PE body tube.
   d. Buna-nitrile seals.
   e. Acetal collets.
   f. Stainless-steel bolts, nuts, and washers.

7. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Dresser Piping Specialties; Division of Dresser, Inc.
      2) Smith-Blair, Inc.
   b. Stainless-steel flanges and tube with epoxy finish.
   c. Buna-nitrile seals.
   d. Stainless-steel bolts, washers, and nuts.
   e. Factory-installed anode for steel-body couplings installed underground.

2.2 PIPING SPECIALTIES

A. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
4. Corrugated stainless-steel tubing with polymer coating.
5. Operating-Pressure Rating: 0.5 psig.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: Comply with ASME B1.20.1.
8. Maximum Length: 72 inches

B. Quick-Disconnect Devices: Comply with ANSI Z21.41.

1. Copper-alloy convenience outlet and matching plug connector.
2. Nitrile seals.
3. Hand operated with automatic shutoff when disconnected.
4. For indoor or outdoor applications.
5. Adjustable, retractable restraining cable.

C. Y-Pattern Strainers:

1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for NPS 2 and smaller; flanged ends for NPS 2-1/2 and larger.
3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
4. CWP Rating: 125 psig.

D. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

A. Joint Compound and Tape: Suitable for natural gas.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

C. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

2.4 MANUAL GAS SHUTOFF VALVES

A. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.

B. General Requirements for Metallic Valves, NPS 2 and Smaller: Comply with ASME B16.33.
1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1 or comply with the specific mechanical joint piping system requirements.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 shall have initials "WOG" permanently marked on valve body.

C. General Requirements for Metallic Valves, NPS 2-1/2 and Larger: Comply with ASME B16.38.
1. CWP Rating: 125 psig.
2. Flanged Ends: Comply with ASME B16.5 for steel flanges.
3. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
4. Service Mark: Initials "WOG" shall be permanently marked on valve body.

D. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. BrassCraft Manufacturing Company; a Masco company.
   b. Conbraco Industries, Inc.; Apollo Div.
   c. Lyall, R. W. & Company, Inc.
   d. McDonald, A. Y. Mfg. Co.
   e. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated bronze.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Threaded-body packnut design with adjustable-stem packing.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

E. Bronze Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Lee Brass Company.
   b. McDonald, A. Y. Mfg. Co.
2. Body: Bronze, complying with ASTM B 584.
3. Plug: Bronze.
4. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Operator: Square head or lug type with tamperproof feature where indicated.
6. Pressure Class: 125 psig.
7. Listing: Valves NPS 1 and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
8. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

F. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Flowserve.
   b. Homestead Valve; a division of Olson Technologies, Inc.
   c. McDonald, A. Y. Mfg. Co.
   d. Milliken Valve Company.
   e. Mueller Co.; Gas Products Div.
   f. R&M Energy Systems, A Unit of Robbins & Myers, Inc.

2. Body: Cast iron, complying with ASTM A 126, Class B.
3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

G. PE Ball Valves: Comply with ASME B16.40.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Kerotest Manufacturing Corp.
   b. Lyall, R. W. & Company, Inc.
   c. Perfection Corporation; a subsidiary of American Meter Company.
2. Body: PE.
3. Ball: PE.
4. Stem: Acetal.
5. Seats and Seals: Nitrile.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: 80 psig.
8. Operating Temperature: Minus 20 to plus 140 deg F.
9. Operator: Nut or flat head for key operation.
10. Include plastic valve extension.
11. Include tamperproof locking feature for valves where indicated on Drawings.

H. Valve Boxes:

1. Cast-iron, two-section box.
2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of 5 inches in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.

2.5 MOTORIZED GAS VALVES

A. Electrically Operated Valves: Comply with UL 429.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ASCO Power Technologies, LP; Division of Emerson.
   b. Dungs, Karl, Inc.
   c. Eclipse Combustion, Inc.

d. Goyen Valve Corp.; Tyco Environmental Systems.
e. Magnatrol Valve Corporation.
f. Parker Hannifin Corporation; Climate & Industrial Controls Group; Skinner Valve Div.
g. Watts Regulator Co.; Division of Watts Water Technologies, Inc.

2. Pilot operated.

3. Body: Brass or aluminum.

4. Seats and Disc: Nitrile rubber.

5. Springs and Valve Trim: Stainless steel.

6. 120-V ac, 60 Hz, Class B, continuous-duty molded coil, and replaceable.

7. NEMA ICS 6, Type 4, coil enclosure.

8. Normally closed.

9. Visual position indicator.

2.6 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.

2. Steel jacket and corrosion-resistant components.

3. Elevation compensator.

4. End Connections: Threaded for regulators NPS 2 and smaller; flanged for regulators NPS 2-1/2 and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Actaris.
b. American Meter Company.
c. Fisher Control Valves and Regulators; Division of Emerson Process Management.
d. Invensys.
e. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.

3. Springs: Zinc-plated steel; interchangeable.

4. Diaphragm Plate: Zinc-plated steel.

5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.

6. Orifice: Aluminum; interchangeable.

7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.

8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.

9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.

10. Overpressure Protection Device: Factory mounted on pressure regulator.

11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.

12. Maximum Inlet Pressure: 100 psig.

C. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Actaris.
   b. American Meter Company.
   c. Eclipse Combustion, Inc.
   d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
   e. Invensys.
   f. Maxitrol Company.
   g. Richards Industries; Jordan Valve Div.

2. Body and Diaphragm Case: Cast iron or die-cast aluminum.

3. Springs: Zinc-plated steel; interchangeable.

4. Diaphragm Plate: Zinc-plated steel.

5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.

6. Orifice: Aluminum; interchangeable.

7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.

8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.

9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.

10. Overpressure Protection Device: Factory mounted on pressure regulator.

11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.

12. Maximum Inlet Pressure: 2 psig.

D. Appliance Pressure Regulators: Comply with ANSI Z21.18.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Canadian Meter Company Inc.
   b. Eaton Corporation; Controls Div.
   c. Harper Wyman Co.
   d. Maxitrol Company.
   e. SCP, Inc.

2. Body and Diaphragm Case: Die-cast aluminum.

3. Springs: Zinc-plated steel; interchangeable.

4. Diaphragm Plate: Zinc-plated steel.

5. Seat Disc: Nitrile rubber.

6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.

7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.

8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.

9. Maximum Inlet Pressure: 2 psig.

2.7 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Capitol Manufacturing Company.
   b. Central Plastics Company.
   c. Hart Industries International, Inc.
   d. Jomar International Ltd.
   e. Matco-Norca, Inc.
   f. McDonald, A. Y. Mfg. Co.
   g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   h. Wilkins; a Zurn company.

2. Description:
   a. Standard: ASSE 1079.
   b. Pressure Rating: 125 psig minimum at 180 deg F.
   c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Capitol Manufacturing Company.
   b. Central Plastics Company.
   c. Matco-Norca, Inc.
   d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   e. Wilkins; a Zurn company.

2. Description:
   a. Standard: ASSE 1079.
   b. Factory-fabricated, bolted, companion-flange assembly.
   c. Pressure Rating: 125 psig minimum at 180 deg F.
   d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Central Plastics Company.
   d. Pipeline Seal and Insulator, Inc.

2. Description:
   a. Nonconducting materials for field assembly of companion flanges.
   b. Pressure Rating: 150 psig.
   c. Gasket: Neoprene or phenolic.

d. Bolt Sleeves: Phenolic or polyethylene.
e. Washers: Phenolic with steel backing washers.

2.8 LABELING AND IDENTIFYING

A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

B. Label and identify gas piping and pressure outside a multitenant building by tenant.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.

B. The installing contractor shall examine the pipe and fittings for defects, sand holes or cracks. There shall be no defects of the pipe or fittings. Any damaged pipe or fittings shall be rejected.

C. The installing contractor shall insure that internal components of the cold press mechanical joint press fitting are properly in place and free from damage. This is to include sealing elements, grip ring & separator rings.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

B. Inspect natural-gas piping according to NFPA 54 and the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.

C. Comply with NFPA 54 and the International Fuel Gas Code requirements for prevention of accidental ignition.

D. Carbon steel pipe shall be cut with an approved pipe cutting tool. The pipe shall be cut square to permit proper joining with the fittings.

E. Remove scale, slag, dirt and debris from inside and outside of pipe and fittings before assembly. The protective coating shall be removed from the outside of the pipe end and shall be wiped clean and dry. The burrs on the pipe shall be reamed with a deburring or reaming tool.

3.3 INSTALLATION OF OUTDOOR PIPING

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Install underground, natural-gas piping buried at least 36 inches below finished grade. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

1. If natural-gas piping is installed less than 36 inches below finished grade, install it in containment conduit.

C. Install underground, PE, natural-gas piping according to ASTM D 2774.

D. Install a tracer wiring 18” above all underground gas piping installations.

E. Steel Piping with Protective Coating:

1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
3. Replace pipe having damaged PE coating with new pipe.

F. Install fittings for changes in direction and branch connections.

G. Where required, install a protective anode for underground metallic piping system.

H. Install pressure gage downstream from each service regulator. Pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

3.4 INDOOR PIPING INSTALLATION

A. Comply with NFPA 54 and the International Fuel Gas Code for installation and purging of natural-gas piping.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Pressure ratings: Components shall have a pressure rating equal to or greater than the system operating pressure.

D. Install piping free of sags, bends and kinks.

E. Press Fittings: Cold Press Mechanical Joint Fittings shall be installed in accordance with the manufacturer’s installation instructions. The protective corrosion coating shall be removed from the outside of the pipe end. The pipe shall be fully inserted into the fitting and the pipe marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark on the pipe to assure the pipe is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool(s) approved by the manufacturer.

F. Pipe Protection: Pipe shall be protected against abrasion where pipe is in contact with other building members by an approved tape, pipe insulation or otherwise suitable method of isolation.

G. Penetration Protection: Provide allowance for thermal expansion and contraction of pipe passing through a wall, floor, ceiling or partition by wrapping with an approved tape or pipe insulation or by installing through an appropriately sized sleeve. Penetrations for fire resistant rated assemblies shall maintain the rating of the assembly.

H. Backfill Material: Backfill material shall not include any ashes, cinders, refuse, stones, boulders or other materials which can damage or break the piping or promote corrosive action in any trench or excavation in which piping is installed.

I. Horizontal Support: Install hangers for horizontal piping in accordance with MSS SP 58.

J. Vertical Support: Pipe shall be supported at each floor.

K. Galvanic Corrosion: Hangers and supports shall be applicable to prevent galvanic corrosion between the system and the supporting members.

L. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.

M. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

N. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

O. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

P. Locate valves for easy access.

Q. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.

R. Install fittings for changes in direction and branch connections.

S. Verify final equipment locations for roughing-in.

T. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.

U. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.

V. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

W. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.

X. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.

2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
    a. Exception: Tubing passing through partitions or walls does not require striker barriers.
3. Prohibited Locations:
    a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
    b. Do not install natural-gas piping in solid walls or partitions.

Y. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.

Z. Connect branch piping from top or side of horizontal piping.

AA. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.

BB. Do not use natural-gas piping as grounding electrode.

CC. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

DD. Install pressure gage downstream from each line regulator. Pressure gages are specified in Section 220519 "Meters and Gages for Plumbing Piping."

EE. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

FF. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

GG. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.5 INSTALLATION OF VALVES

A. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.

B. Install underground valves with valve boxes.

C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.

D. Install anode for metallic valves in underground PE piping.

E. Do not install valves in return-air plenums.

3.6 PIPING JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints:

1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
2. Cut threads full and clean using sharp dies.
3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
4. Apply appropriate Teflon tape or thread compound to external pipe threads unless dryseal threading is specified.
5. 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.

D. Welded Joints:

1. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
2. Bevel plain ends of steel pipe.
3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

E. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.

F. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.

G. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.

1. Plain-End Pipe and Fittings: Use butt fusion.
2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.7 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements in Section 230529 "Hangers and Supports for HVAC Piping and Equipment" for hangers, supports, and anchor devices.

B. Maximum spans below from NFPA 54 or MSS SP-69 shall not be exceeded. Copper-tube sizes were adjusted to ASTM B 88 (ASTM B 88M).

C. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1 and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
2. NPS 1-1/4: Maximum span, 108 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2 and NPS 2: Maximum span, 108 inches; minimum rod size, 3/8 inch.

D. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:

1. NPS 3/8: Maximum span, 48 inches; minimum rod size, 3/8 inch.

2. NPS 1/2: Maximum span, 72 inches; minimum rod size, 3/8 inch.

3. NPS 3/4 and Larger: Maximum span, 96 inches; minimum rod size, 3/8 inch.

3.8 PIPING CONNECTIONS

A. Connect to utility's gas main according to utility's procedures and requirements.

B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.

C. Where installing piping adjacent to appliances, allow space for service and maintenance of appliances.

D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.

E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance. Where there is a battery of gas fired appliances with a single pipe drop and header behind equipment, a single sediment trap at the base of the pipe drop may be used.

3.9 LABELING AND IDENTIFYING

A. Comply with requirements in Section 220553 "Identification for Plumbing Piping and Equipment" for piping and valve identification.

B. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 PAINTING

A. Comply with requirements in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for painting interior and exterior natural-gas piping.

B. Do not paint stainless steel piping.

C. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Alkyd System: MPI EXT 5.1D.
    a. Prime Coat: Alkyd anticorrosive metal primer.
    b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
    c. Topcoat: Exterior alkyd enamel (semigloss).
    d. Color: As indicated by Architect.

D. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.
    a. Prime Coat: Quick-drying alkyd metal primer.
    b. Intermediate Coat: Interior latex matching topcoat.
    c. Topcoat: Interior latex (satin).

d. Color: As indicated by Architect.

E. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.11 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Test, inspect, and purge natural gas according to NFPA 54 and the International Fuel Gas Code and authorities having jurisdiction.

2. Natural-gas piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports

D. Air Testing: The piping system shall be air tested for joint tightness. The piping system shall be pressurized with air to the maximum pressure of the system or to the code or standard required minimum for the required length of time. The system shall have no leaks at the rated pressure.

E. Natural-gas piping will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

3.12 OUTDOOR PIPING SCHEDULE

A. Underground natural-gas piping shall be one of the following:

1. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.

2. Steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.

B. Aboveground natural-gas piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

2. Steel pipe with wrought-steel fittings and welded joints.

C. Branch Piping in Cast-in-Place Concrete: Shall not be permitted.

D. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

3.13 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

2. Steel pipe with wrought-steel fittings and welded joints.

3. Steel pipe with pressure seal joints, sized up thru 4” (DN 100).

C. Underground, below building, piping shall be the following:

1. Shall not be permitted.

D. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

E. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.14 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG AND LESS THAN 5 PSIG

A. Aboveground, branch piping NPS 1 and smaller shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, distribution piping shall be one of the following:

1. Steel pipe with malleable-iron fittings and threaded joints.
2. Steel pipe with steel welding fittings and welded joints.

C. Underground, below building, piping shall be one of the following:

1. Shall not be permitted.

D. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat underground pipe and fittings with protective coating for steel piping.

E. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.15 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 and smaller at service meter shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.

B. Valves for pipe sizes NPS 2-1/2 and larger at service meter shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, lubricated plug valve.

C. Distribution piping valves for pipe sizes NPS 2 and smaller shall be one of the following:

1. Two-piece, full-port, bronze ball valves with bronze trim.
2. Bronze plug valve.

D. Valves in branch piping for single appliance shall be one of the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, full-port, bronze ball valves with bronze trim.

3. Bronze plug valve.

END OF SECTION 221114

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper tube and fittings.
2. Ductile-iron pipe and fittings.
3. Piping joining materials.
4. Transition fittings.
5. Dielectric fittings.

1.2 ACTION SUBMITTALS

A. Product Data:

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Piping layout, or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.

B. System purging and disinfecting activities report.

C. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installers of pressure-sealed joints are to be certified by pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Domestic water piping, tubing, fittings, joints, and appurtenances intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act, with requirements of authorities having jurisdiction, and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

2.2 PIPING MATERIALS

A. Potable-water piping and components are to comply with NSF 14, NSF 61, and NSF 372Comply with NSF Standard 372.

2.3 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tube (Hard): ASTM B 88, Type L water tube, drawn temper.

B. Annealed-Temper Copper Tube (Soft): ASTM B 88, Type K water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings. pressure fittings. Do not use solder joints on pipe sizes greater than NPS 4.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Do not use solder joints on pipe sizes greater than NPS 4.

F. Cast Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends. Do not use solder joints on pipe sizes greater than NPS 4.

G. Wrought Copper Unions: ASME B16.22. Do not use solder joints on pipe sizes greater than NPS 4.

H. Pressure-Seal-Joint Fittings, Copper or Bronze - Domestic Water:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Viega ProPress
   b. Apollo Press
2. Housing: Copper.
3. O-Rings and Pipe Stops: EPDM.
4. Tools: Manufacturer's special tools.
5. Minimum 200 psig working-pressure rating at 250 deg F.

I. Copper-Tube, Push-on-Joint Fittings - Domestic Water:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Nibco
   b. Lehigh Valley
   c. Sharkbite
2. Description:
   a. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
   b. Stainless steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

2.4 DUCTILE-IRON PIPE AND FITTINGS- DOMESTIC WATER

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Standard-Pattern, Mechanical-Joint Fittings:

1. AWWA C110/A21.10, ductile or gray iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. Compact-Pattern, Mechanical-Joint Fittings:

1. AWWA C153/A21.53, ductile iron.

2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

D. Standard-Pattern, Push-on Joint Fittings:

1. AWWA C110/A21.10, ductile or gray iron.

2. Gaskets: AWWA C111/A21.11, rubber.

E. Compact-Pattern, Push-on Joint Fittings:

1. AWWA C153/A21.53, ductile iron.

2. Gaskets: AWWA C111/A21.11, rubber.

F. Plain-End, Ductile-Iron Pipe: AWWA C151/A21.51.

G. Appurtenances for Grooved-End, Ductile-Iron Pipe - Domestic Water:

1. Fittings for Grooved-End, Ductile-Iron Pipe: ASTM A47/A47M, malleable-iron castings or ASTM A536, ductile-iron castings with dimensions that match pipe.

2. Mechanical Couplings for Grooved-End, Ductile-Iron-Piping:
   a. AWWA C606 for ductile-iron-pipe dimensions.
   b. Ferrous housing sections.
   c. EPDM-rubber gaskets suitable for hot and cold water.
   d. Bolts and nuts.
   e. Minimum Pressure Rating:
      1) NPS 14 to NPS 18 (DN 350 to DN 450): 250 psig.

2.5 PIPING JOINING MATERIALS - DOMESTIC WATER

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.

2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8M/A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

2.6 TRANSITION FITTINGS - DOMESTIC WATER

A. General Requirements:

1. Same size as pipes to be joined.

2. Pressure rating at least equal to pipes to be joined.

3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.7 DIELECTRIC FITTINGS - DOMESTIC WATER

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions - Domestic Water::

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. A.Y. McDonald Mfg. Co.
   b. Capitol Manufacturing Company.
   c. Central Plastics Company.
   d. HART Industrial Unions, LLC.
   e. Jomar Valve.
   f. Matco-Norca.
   g. WATTS.
   h. Wilkins.
   i. Zurn Industries, LLC.
2. Standard: ASSE 1079.
3. Pressure Rating: 125 psig minimum at 180 deg F.
4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges - Domestic Water:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Capitol Manufacturing Company.
   b. Central Plastics Company.
   c. Matco-Norca.
   d. WATTS.
   e. Wilkins.
   f. Zurn Industries, LLC.
2. Standard: ASSE 1079.
3. Factory-fabricated, bolted, companion-flange assembly.
4. Pressure Rating: 125 psig minimum at 180 deg F.
5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Kits - Domestic Water:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Central Plastics Company.
   d. Pipeline Seal and Insulator, Inc.
2. Nonconducting materials for field assembly of companion flanges.
3. Pressure Rating: 150 psig.
4. Gasket: Neoprene or phenolic.

5. Bolt Sleeves: Phenolic or polyethylene.

6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples - Domestic Water:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Elster Perfection Corporation.
   b. Grinnell G-Fire by Johnson Controls Company.
   c. Matco-Norca.
   d. Precision Plumbing Products.
   e. Sioux Chief Manufacturing Company, Inc.
   f. Victaulic Company.

2. Standard: IAPMO PS 66.

3. Electroplated steel nipple complying with ASTM F 1545.

4. Pressure Rating and Temperature: 300 psig at 225 deg F.

5. End Connections: Male threaded or grooved.

6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.2 INSTALLATION OF PIPING

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground [**copper tube**] [**and**] [**ductile-iron pipe**] in PE encasement in accordance with ASTM A674 or AWWA C105/A21.5.

E. Install valves in accordance with Section 220523 "General-Duty Valves for Plumbing Piping."

F. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements for pressure-reducing valves in Section 221119 "Domestic Water Piping Specialties."

G. Install domestic water piping level without pitch and plumb.

H. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

I. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

J. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

K. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

L. Install piping to permit valve servicing.

M. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

N. Install piping free of sags and bends.

O. Install fittings for changes in direction and branch connections.

P. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

Q. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Comply with requirements for pressure gages in Section 220519 "Meters and Gages for Plumbing Piping."

R. Install thermostats in hot-water circulation piping. Comply with requirements for thermostats in Section 221123 "Domestic Water Pumps."

S. Install thermometers on outlet piping from each water heater. Comply with requirements for thermometers in Section 220519 "Meters and Gages for Plumbing Piping."

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of iron pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. 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:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B813, water-flushable flux to end of tube. Join copper tube and fittings in accordance with ASTM B828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools and procedure recommended by pressure-seal-fitting manufacturer. Leave insertion marks on pipe after assembly.

G. Push-on Joints for Copper Tubing: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on joint fittings by inserting tube to measured depth.

H. Extruded-Tee Connections: Form tee in copper tube in accordance with ASTM F2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.

I. Joint Construction for Grooved-End Copper Tubing: Make joints in accordance with AWWA C606. Roll groove ends of tubes. Lubricate and install gasket over ends of tubes or tube and fitting. Install coupling housing sections over gasket with keys seated in tubing grooves. Install and tighten housing bolts.

J. Joint Construction for Grooved-End, Ductile-Iron Piping: Make joints in accordance with AWWA C606. Cut round-bottom grooves in ends of pipe at gasket-seat dimension required for specified (flexible or rigid) joint. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket with keys seated in piping grooves. Install and tighten housing bolts.

K. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

L. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.4 INSTALLATION OF TRANSITION FITTINGS

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 and Larger: Sleeve-type coupling.

3.5 INSTALLATION OF DIELECTRIC FITTINGS

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings or nipples or unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges or nipples.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger, support products, and installation in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Install hangers for copper with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Install vinyl-coated hangers for C**PVC** pipe, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

E. Install vinyl-coated hangers for PEX tube, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

F. Support horizontal piping within 12 inches of each fitting.

G. Support vertical piping and tubing at base and at each floor.

H. Support vertical runs of copper tube and pipe to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

I. Support vertical runs of **CPVC** pipe to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

J. Support vertical runs of PEX tube to comply with manufacturer's written instructions at not more than 48 inches (1200 mm), locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

K. Support piping and tubing not listed in this article according to MSS SP-58 and manufacturer's written instructions.

3.7 PIIPNG CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.

4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.8 IDENTIFICATION

A. Identify system components. Comply with requirements for identification materials and installation in Section 220553 "Identification for Plumbing Piping and Equipment."

B. Label pressure piping with system operating pressure.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.

2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
   a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
   b. Fill and isolate system according to either of the following:
      1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
      2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
   c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
   d. Repeat procedures if biological examination shows contamination.
   e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.

3. Open throttling valves to proper setting.

4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
   b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.

6. Remove and clean strainer screens. Close drain valves and replace drain plugs.

7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.

8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.11 FIELD QUALITY CONTROL

A. Tests and Inspections

1. Piping Inspections:
   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 one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.
   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:
   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 a 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. 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 it to stand for two 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 for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports..

3.12 PIPING APPLICATIONS

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 3 to NPS 8 and larger, shall be one of the following:

1. Mechanical-joint, ductile-iron pipe; **standard or compact** pattern, mechanical-joint fittings; and mechanical joints .Caution: Ductile-iron piping in two subparagraphs below must be installed with restrained joints.
2. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; flanged and gasketed joints.
3. Ductile-iron piping under slab must be installed with restrained joints.

E. Under-building-slab fire-service-main piping, NPS 6 to NPS 12, shall be the following:

1. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

F. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and solder joints.
2. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.

G. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought-copper, solder-joint fittings; and soldered joints.
2. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
3. Hard copper tube, ASTM B 88, Type L; grooved-joint, copper-tube appurtenances; and grooved joints.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Strainers for domestic water piping.
7. Drain valves.
8. Water-hammer arresters.
9. Trap-seal primer device.

A. Related Requirements:

1. Section 220500 "Common Work Results for Plumbing."
2. Section 220519 "Meters and Gages for Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
3. Section 221116 "Domestic Water Piping" for water piping
4. Section 224000 "Plumbing Fixtures" for hose bibbs, wall hydrants, trap seal primer valves and vacuum breakers integral with fixtures.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Test and inspection reports.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

A. Potable-water piping and components shall comply with NSF 61 Annex G and NSF 14.

2.2 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig unless otherwise indicated.

2.3 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Standard: ASSE 1001.
2. Size: NPS 1/4 to NPS 3, as required to match connected piping.
3. Body: Bronze.
4. Inlet and Outlet Connections: Threaded.
5. Finish: Rough bronze in mechanical or service spaces. Chrome plated in finished spaces.

B. Hose-Connection Vacuum Breakers:

1. Standard: ASSE 1011.
2. Body: Bronze, nonremovable, with manual drain.
3. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
4. Finish: Rough bronze in mechanical or service spaces. Chrome plated in finished spaces.

2.4 BACKFLOW PREVENTERS

A. Intermediate Atmospheric-Vent Backflow Preventers:

1. Standard: ASSE 1012.
2. Operation: Continuous-pressure applications.
3. Size: **NPS 1/2**
4. Body: Bronze.
5. End Connections: Union, solder joint.
6. Finish: Rough bronze in mechanical or service spaces. Chrome plated in finished spaces.

B. Reduced-Pressure-Principle Backflow Preventers:

1. Standard: ASSE 1013.
2. Operation: Continuous-pressure applications.
3. Pressure Loss: 12 psig maximum, through middle third of flow range.
4. Size and performance: As indicated
5. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved or stainless steel for NPS 2-1/2 and larger.
6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
7. Configuration: Designed for horizontal, straight-through or other flow configuration where shown and as permitted by local jurisdiction.
8. Accessories:
   a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
   b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.
   c. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

C. Double-Check, Backflow-Prevention Assemblies:

1. Standard: ASSE 1015.

2. Operation: Continuous-pressure applications unless otherwise indicated.

3. Pressure Loss: 5 psig maximum, through middle third of flow range.

4. Size and performance: As indicated.

5. Body: Bronze or stainless steel (for food service and similar applications) for NPS 2; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.

6. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.

7. Configuration: Designed for horizontal, straight-through flow or other flow configuration where shown and as permitted by local jurisdiction.

8. Accessories:
   a. Valves NPS 2 and Smaller: Ball type with threaded ends on inlet and outlet.
   b. Valves NPS 2-1/2 and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

2.5 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Cash Acme; a division of Reliance Worldwide Corporation.
   b. Conbraco Industries, Inc.
   c. Honeywell International Inc.
   d. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
   e. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.

2. Standard: ASSE 1003.

3. Pressure Rating: Initial working pressure of 150 psig.

4. Size and performance: As indicated.

5. Body: Bronze (with chrome-plated finish in finished areas) for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.

6. Valves for Booster Heater Water Supply: Include integral bypass.

7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.6 BALANCING VALVES

A. Memory-Stop Calibrated Orifice Balancing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Armstrong Pumps, Inc.
   b. Bell & Gossett Domestic Pump.
   c. Taco.
   d. Tour & Andersson; available through Victaulic Company

2. Standard: MSS SP-110 for two-piece, copper-alloy ball valves.

3. Pressure Rating: 400-psig minimum CWP.

4. Size: NPS 2 or smaller.

5. Body: Lead free brass or Copper alloy.

6. Port: Standard or full port.
7. Ball: Chrome-plated brass or stainless steel.
8. Seats and Seals: Replaceable EPDM.
9. End Connections: Threaded.
10. Handle: Vinyl-covered steel with memory-setting device.

2.7 TEMPERATURE-ACTUATED, WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Leonard Valve Company.
   b. Cash Acme; a division of Reliance Worldwide Corporation.
   c. Powers; a division of Watts Water Technologies, Inc.
   d. Symmons Industries, Inc.
   e. TACO Incorporated.
   f. Watts; a division of Watts Water Technologies, Inc.; Watts Regulator Company.
   g. Zurn Industries, LLC; Plumbing Products Group; Wilkins Water Control Products.
2. Standard: ASSE 1070.
3. Pressure Rating: 125 psig.
4. Type: Thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded or union inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Tempered-Water Setting: As indicated or required.
9. Tempered-Water Design Flow Rate and pressure drop: As indicated
10. Valve Finish: Rough bronze in mechanical or service spaces, Chrome plated in finished spaces.

B. Primary, Thermostatic, Water Mixing Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Armstrong International, Inc.
   b. Lawler Manufacturing Company, Inc.
   c. Leonard Valve Company.
   d. Powers; a division of Watts Water Technologies, Inc.
   e. Symmons Industries, Inc.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psigminimum unless otherwise indicated.
4. Type: Exposed-mounted, thermostatically controlled, water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded or union inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.

8. Tempered-Water Setting: As indicated.
9. Tempered-Water Design Flow Rate: As indicated or required
10. Selected Valve Pressure drop: as indicated.
11. Valve Finish: Rough bronze in mechanical or service spaces, Chrome plated in finished spaces.
12. Piping Finish: Copper.

2.8 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

1. Pressure Rating: 125 psig minimum unless otherwise indicated.
2. Body: Bronze for NPS 2 and smaller; cast iron with interior lining that complies with AWWA C550 or that is FDA approved, epoxy coated and for NPS 2-1/2 and larger.
3. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
4. Screen: Stainless steel with round perforations unless otherwise indicated.
5. Perforation Size:
   a. Strainers NPS 2 and Smaller: 0.033 inch.
   b. Strainers NPS 2-1/2 to NPS 4: 0.045 inch.
6. Drain: Factory-installed, hose-end drain valve.

2.9 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 400-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

2.10 WATER-HAMMER ARRESTERS

A. Water-Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. AMTROL, Inc.
   b. Josam Company.
   c. MIFAB, Inc.
   d. Precision Plumbing Products, Inc.
   e. Sioux Chief Manufacturing Company, Inc.
   f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   g. Tyler Pipe; Wade Div.

h. Watts Drainage Products.
i. Zurn Industries, LLC; Plumbing Products Group; Specification Drainage Products.

2. Standard: ASSE 1010 or PDI-WH 201.

3. Type: Copper tube with piston.

4. Size: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

PART 3 - PART 3 - EXECUTION

3.1 INSTALLATION

A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe-to-floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are unacceptable for this application.

3. Do not install bypass piping around backflow preventers.

B. Water Regulators: Install with inlet and outlet shutoff valves. Install pressure gauges on inlet and outlet.

C. Balancing Valves: Install in locations where they can easily be adjusted. Set at indicated design flow rates.

D. Temperature-Actuated, Water Mixing Valves: Install with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install cabinet-type units recessed in or surface mounted on wall as specified.

E. Y-Pattern Strainers: For water, install on supply side of each control valve and pump.

F. Water-Hammer Arresters: Install in water piping in accordance with PDI-WH 201. Hot and cold supply lines to have manufactured pre-charged piston type water hammer arrestors at each solenoid actuated quick closing valve location including but not limited to dishwashers, clothes washers, ice makers, electronic faucets and similar items as required by code. An arrester shall also be required at each fixture, fixture group or battery of fixtures to prevent water hammer.

G. Hot and cold supply lines to have manufactured pre-charged piston type water hammer arrestors at each and every fixture or group or battery of fixtures to prevent water hammer, sized as shown or per manufacturers recommendation. An arrestor shall also be required at each solenoid actuated quick closing valve location including but not limited to dishwashers, clothes washers, ice makers, electronic faucets and similar items. ot and cold supply lines to have manufactured pre-charged piston type water hammer arrestors at each and every fixture or group or battery of fixtures to prevent water hammer, sized as shown or per manufacturers recommendation. An arrestor shall also be required at each solenoid actuated quick closing valve location including but not limited to dishwashers, clothes washers, ice makers, electronic faucets and similar items. ot and cold supply lines to have manufactured pre-charged piston type water hammer arrestors at each and every fixture or group or battery of fixtures to prevent water hammer, sized as shown or per manufacturers recommendation. An arrestor shall also be required at each solenoid actuated quick closing valve location including but not limited to dishwashers, clothes washers, ice makers, electronic faucets and similar items. Water-hammer

arresters in first paragraph below are best shown on water risers and details. Specifying number, size, and location here is difficult.

H. All cable ties for controls and other cable systems located in plenums utilized for air movement that are not installed in conduit shall be 25/50 flame and smoke rated, Hellermann Tyton T50R2C2UL or equal.

I. Where not provided by other trades and access to plumbing specialties, valves and other items is required in inaccessible ceiling or wall spaces, provide an access door, minimum 12”x12” size with frame style suitable for the type of construction where installed, whether gypsum, concrete or masonry.

1. Access door shall be, 16 gage steel, keyed cylinder lock, flush mounted, concealed hinge. Provide baked enamel finish in unfinished areas or with painted walls. Provide stainless steel where located in tile walls.
2. Standard door shall be Milcor type ‘M’.
3. Fire rated door shall be Milcor type ‘UFR’, UL labeled 1-1/2 hour fire rated self-closing, insulated door panel where located in rated assemblies.
4. Acceptable manufacturers are Zurn, JL Industries and KARP.

1.2 PIPING CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping specialties adjacent to equipment and machines, allow space for service and maintenance.

C. Fire-retardant-treated-wood blocking is specified in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" for electrical connections.

1.3 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install electrical devices furnished by manufacturer, but not factory mounted, in accordance with NFPA 70 and NECA 1.

1.4 CONTROL CONNECTIONS

A. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

1.5 IDENTIFICATION

A. Plastic Labels for Equipment: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.

4. Balancing valves.
5. Temperature-actuated, water mixing valves.
6. Trap-seal primer device.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

1.6 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated, water mixing valves.

D. Adjust each reduced-pressure-principle backflow preventer double-check, backflow-prevention assembly, double-check, detector-assembly backflow preventer Temperature-actuated, and water mixing valves, in accordance with manufacturer's written instructions, authorities having jurisdiction and the device's reference standard.

1.7 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.

1. Test each reduced-pressure-principle backflow preventer double-check, backflow-prevention assembly and double-check, detector-assembly backflow preventer, according to authorities having jurisdiction and the device's reference standard.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

END OF SECTION 221119

SECTION 221123 - IN-LINE DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. In-line, sealless centrifugal pumps.
2. Horizontally mounted, in-line, close-coupled centrifugal pumps.

1.2 ACTION SUBMITTALS

A. Product Data.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Detail pumps and adjacent equipment, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: UL 778 for motor-operated water pumps.

C. Drinking Water System Components - Health Effects and Drinking Water System Components - Lead Content Compliance: NSF 61 and NSF 372.

2.2 HORIZONTALLY MOUNTED, IN-LINE, CLOSE-COUPLED CENTRIFUGAL PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Armstrong Pumps Inc.
2. Bell & Gossett Domestic Pump; ITT Corporation.
3. Grundfos Pumps Corporation, U.S.A.
4. Pentair Pump Group; Aurora Pump.
5. TACO Incorporated.

B. Description: Factory-assembled and -tested, in-line, single-stage, close-coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shaft mounted horizontal.

C. Pump Construction:

1. Casing:
   a. Radially split bronze or brass with threaded companion-flange connections for pumps with NPS 2 pipe connections and flanged connections for pumps with NPS 2-1/2 pipe connections.
   b. Built to permit servicing of pump internals without disturbing the casing or the suction and discharge piping.
   c. Gauge port tappings at suction and discharge nozzles.
2. Impeller: Bronze or Brass or stainless steel, Statically and dynamically balanced, closed, and keyed to shaft.
3. Shaft and Shaft Sleeve: Steel shaft with deflector, with copper-alloy shaft sleeve. Include water slinger on shaft between motor and seal.
4. Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
5. Seal: Mechanical, carbon on silicon carbide, stainless-steel spring, ceramic seat, and rubber bellows and gasket.
6. Bearings: Permanently lubricated ball bearing.

D. Motor: Single speed, with grease-lubricated ball bearings; and resiliently or rigidly mounted to pump casing.

E. Capacities and Characteristics:

1. Capacity and operating characteristics: As indicated on drawings.
2. Impeller Material: Noryl, ASTM B 584, cast bronze or stainless steel.
3. Minimum Working Pressure: 175 psig.
4. Continuous Operating Temperature: 225°F
5. Pump Control: Thermostat and Timer.

2.3 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

2.4 CONTROLS

A. Thermostats: Electric; adjustable for control of hot-water circulation pump.

1. Type: Water-immersion temperature sensor, for installation in piping.
2. Range: 50 to 125 deg F.
3. Enclosure: NEMA 250, Type 4X.
4. Operation of Pump: On or off.
5. Transformer: Provide if required.
6. Power Requirement: 120 V, ac.

7. Settings: Start pump at 105 deg F and stop pump at 115 deg F.

B. Timers: Electric, for control of hot-water circulation pump.

1. Type: Programmable, seven-day clock with manual override on-off switch.
2. Enclosure: NEMA 250, Type 1, suitable for wall mounting.
3. Operation of Pump: On or off.
4. Transformer: Provide if required.
5. Power Requirement: 120-V ac.
6. Programmable Sequence of Operation: Up to two on-off cycles each day for seven days.

PART 3 - EXECUTION

3.1 PUMP INSTALLATION

A. Comply with HI 1.4.

B. Mount pumps in orientation complying with manufacturer's written instructions.

C. Install continuous-thread hanger rods and vibration isolation of size required to support pump weight.

1. Comply with requirements for hangers and supports specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

D. Install thermostats in hot-water return piping.

E. Install timers adjacent to pump or as noted on the drawings.

F. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment" for identification of pumps.

G. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment" for identification of pumps.

H. 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 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/sensors.
10. Adjust timer settings.

3.2 PIPING CONNECTIONS

A. Comply with requirements for piping specified in Section 221116 "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to inline, domestic-water pumps, allow space for service and maintenance.

C. 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:
   a. Horizontally mounted, in-line, close-coupled centrifugal pumps.
   b. Comply with requirements for flexible connectors specified in Section 221116 "Domestic Water Piping."

D. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping. Comply with requirements for valves specified in Section 220523" General Duty Valves for Plumbing Piping," and comply with requirements for strainers specified in Section 221119 "Domestic Water Piping Specialties."

1. Install pressure gage and snubber at suction of each pump and pressure gage and snubber at discharge of each pump or a compound gage may be used in lieu of 2 gages.. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Comply with requirements for pressure gauges and snubbers specified in Section 220500 "Common Work Results for Plumbing

E. Connect thermostats and timers to pumps that they control.

3.3 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring between temperature controllers and devices.

C. Interlock pump between water heater and hot-water storage tank with water heater burner and time-delay relay.

3.4 FIELD QUALITY CONTROL

A. Testing Agency:

1. Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections with the assistance of a factory-authorized service representative.

C. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Inline, domestic-water pump will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust domestic water pumps to function smoothly, and lubricate as recommended by manufacturer.

B. Adjust initial temperature set points.

C. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 221123

SECTION 22 13 13
FACILITY SANITARY SEWERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

B. City of Joplin, Missouri, Standard Specifications, 2025.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail precast concrete manholes and vaults and indicate dimensions, method of field assembly, and components.

1.3 SUMMARY

A. This section Includes waste water piping and related components outside of the building. All private work shall be in accordance with the City of Joplin, Missouri, Standard Specifications, 2025:
   1. Pipe and fittings.
   2. Cleanouts.
   3. Manholes.
   4. Grease interceptors.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

B. Protect pipe, pipe fittings, and seals from dirt and damage.

1.5 PROJECT CONDITIONS

A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
   1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of service.
   2. Do not proceed with interruption of service without Construction Manager's written permission.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping Complying with the City of Joplin, Missouri, Standard Specifications, 2025:
   1. Pipe: ASTM D 3034, SDR 26 PVC sewer pipe with bell-and-spigot ends for gasketed joints confirming with ASTM D 3212.
   2. Fittings: PVC with bell ends.
   3. Gaskets: ASTM F 477, elastomeric seals.

B. Ductile Iron Pipe (DIP) and Fittings Complying with the City of Joplin, Missouri, Standard Specifications, 2025:
   1. Pipe: ANSI/AWWA C150/A21.50 and C151/A21.51. The minimum thickness shall be Special Thickness Class 50.
   2. Joints: Mechanical and push on joints shall conform to ANSI/AWWA C111/A21.11
   3. Coatings, Linings and Polyethylene Encasement in accordance with the City of Joplin, Missouri, Standard Specifications, 2025.

2.2 MANHOLES AND SPECIAL STRUCTURES

A. Standard Precast Concrete Manholes and Special Structures in accordance with the City of Joplin, Missouri, Standard Specifications, 2025.
   1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints. All concrete shall be corrosion resistant using ConShield or approved equal antimicrobial additive with contact colorant or approved equal added.
   2. Diameter: 48 inches minimum unless otherwise indicated.
   3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
   4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor unless otherwise indicated.
   5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
   6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
   7. Joint Sealant: Between precast sections, ASTM C 990, bitumen or butyl rubber. Exterior of Joints shall be sealed in accordance with Section 2509.3 6.
   8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
   9. Steps: See the City of Joplin, Missouri, Standard Specifications, 2025.
   10. Adjusting Rings: HDPE or Concrete.

B. Manhole Frames and Covers:
   1. See plans and the City of Joplin, Missouri, Standard Details.

2.3 CLEANOUTS

A. PVC Cleanouts:
   1. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

2.4 CONCRETE

General: Cast-in-place concrete shall comply with the City of Joplin, Missouri, Standard Specifications, 2025.

A. Portland Cement Design Mix: Refer to 2509 F.
   1. Reinforcing Fabric: ASTM A 1064 steel, welded wire fabric, plain.
   2. Reinforcing Bars: ASTM A 615/, Grade 60 deformed steel.

B. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix as noted in the City of Joplin, Missouri, Standard Specifications, 2025
   1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
      a. Invert Slope: 2 percent through manhole.
   2. Benches: Concrete, sloped to drain into channel.

a. Slope: 8 percent.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving". For additional information, reference the City of Joplin, Missouri, Standard Specifications, 2025.

3.2 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, non-pressure, drainage piping according to the following:
1. Install piping pitched down in direction of flow, at minimum slope of 1 percent unless otherwise indicated.
2. Install piping 6” and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping with 42” minimum cover.
4. Install ductile-iron, gravity sewer piping according to ANSI/AWWA C 600.
5. Install PVC Type PSM sewer piping according to ASTM D 2321.

G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 PIPE JOINT CONSTRUCTION

A. Join gravity-flow, non-pressure, drainage piping according to the following:
1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
2. Join dissimilar pipe materials with non-pressure-type, flexible couplings.

B. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
1. Use non-pressure flexible couplings where required to join gravity-flow, non-pressure sewer piping unless otherwise indicated.

a. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.4 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 301.

3.5 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
   1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
   2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.

B. Set cleanout frames and covers in concrete with tops 1 inch above surrounding grade or as noted on project plans.

C. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.6 CONNECTIONS

A. Connect non-pressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste and Vent Piping."

B. Make connections to existing piping and underground manholes.
   1. Use commercially manufactured tee fittings for piping branch connections. Remove section of existing pipe, install tee fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of portland cement concrete with 28-day compressive strength of 4000 psi, in accordance with the City of Joplin, Missouri, Standard Specifications, 2025.

3.7 CLOSING ABANDONED SANITARY SEWER SYSTEMS

A. As noted on the plans.

B. Backfill to grade according to Division 31 Section "Earth Moving."

3.8 IDENTIFICATION

A. Materials and their installation are specified in Division 31 Section "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
   1. Use detectable warning tape over ferrous piping.
   2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.9 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project. Acceptance Tests for Completed Sewer shall be in accordance with the City of Joplin, Missouri, Standard Specifications, 2025
   1. Submit separate report for each system inspection.
   2. Defects requiring correction include the following:

a. Alignment and Deflection: Less than full diameter of inside of pipe is visible between structures.
b. Deflection: City of Joplin, Missouri, Standard Specifications, 2025
c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
d. Infiltration: Water leakage into piping. Section 2508.4
e. Exfiltration: Water leakage from or around piping. Section 2508.4
f. Soil Density: City of Joplin, Missouri, Standard Specifications, 2025. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.

3. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction. Refer to the City of Joplin, Missouri, Standard Specifications, 2025.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Manholes: Perform Test in accordance with the City of Joplin, Missouri, Standard Specifications, 2025.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials and repeat testing until leakage is within allowances specified.

3.10 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 22 13 13

SECTION 221316 SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hubless, cast-iron soil pipe and fittings.
2. PVC pipe and fittings.
3. Specialty pipe fittings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.

B. Field quality-control reports.

1.4 WARRANTY

A. Listed manufacturers to provide labeling and warranty of their respective products.

1.5 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water.
2. Waste, Pressure Piping: 25 psig.

2.2 PIPING MATERIALS

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Charlotte Pipe
2. New Age Casting
3. Tyler Pipe

B. Pipe and Fittings:

1. Marked with CISPI collective trademark.
2. ASTM A 888 or CISPI 301.

C. CISPI, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ANACO-Husky.
   b. Charlotte Pipe and Foundry Company.
   c. Fernco Inc.
   d. Ideal Clamp Products, Inc.
   e. MIFAB, Inc.
   f. Mission Rubber Company; a division of MCP Industries, Inc.
   g. New Age Casting.
   h. Tyler Pipe.
2. Standards: ASTM C 1277 and CISPI 310.
3. Description: Stainless-steel corrugated shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

D. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. ANACO-Husky.
   b. Charlotte Pipe and Foundry Company.
   c. Clamp-All Corp.
   d. Dallas Specialty & Mfg. Co.
   e. Ideal Clamp Products, Inc.
   f. MIFAB, Inc.
   g. Mission Rubber Company, LLC; a division of MCP Industries.
   h. New Age Casting.
   i. Tyler Pipe.
2. Standards: ASTM C 1277 and ASTM C 1540.
3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 COPPER TUBE AND FITTINGS

A. Copper Type DWV Tube: ASTM B 306, drainage tube, drawn temper.

B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.

C. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.

1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

D. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.5 PVC PIPE AND FITTINGS

A. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

B. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent for gravity drainage systems.

C. Solid Wall PVC (SDR series) Pipe: ASTM D 2241 drain and waste for pressure systems.

D. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

E. Adhesive Primer: ASTM F 656.

F. Solvent Cement: ASTM D 2564.

2.6 SPECIALTY PIPE FITTINGS

A. Transition Couplings:

1. General Requirements: Fitting or device for joining piping with small differences in ODs or of different materials. Include end connections of same size as and compatible with pipes to be joined.

2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

3. Shielded, Nonpressure Transition Couplings:
   a. Manufacturers: Subject to compliance with requirements, provide products by the following:
      1) Cascade Waterworks Mfg. Co.
   b. Standard: ASTM C 1460.
   c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
   d. End Connections: Same size as and compatible with pipes to be joined.

4. Pressure Transition Couplings:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Apollo Flow Controls; Conbraco Industries, Inc.
      2) Cascade Waterworks Mfg. Co.
      3) Dresser, Inc.
      4) EBAA Iron, Inc.
      5) Ford Meter Box Company, Inc. (The).
      6) Jay R. Smith Mfg Co; a division of Morris Group International.
      7) JCM Industries, Inc.
      8) Romac Industries, Inc.

b. Standard: AWWA C219.
c. Description: Metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
d. Center-Sleeve Material: Manufacturer's standard.
e. Gasket Material: Natural or synthetic rubber.
f. Metal Component Finish: Corrosion-resistant coating or material.

B. Dielectric Fittings:

1. Dielectric Unions:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) A.Y. McDonald Mfg. Co.
      2) Capitol Manufacturing Company.
      3) Central Plastics Company.
      4) HART Industrial Unions, LLC.
      5) Jomar Valve.
      6) Matco-Norca.
      7) WATTS.
      8) Wilkins.
   b. Description:
      1) Standard: ASSE 1079.
      2) Pressure Rating: 125 psig minimum at 180 deg F.
      3) End Connections: Solder-joint copper alloy and threaded ferrous.

2. Dielectric Flanges:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Capitol Manufacturing Company.
      2) Central Plastics Company.
      3) Matco-Norca.
      4) WATTS.
      5) Wilkins.
   b. Description:
      1) Standard: ASSE 1079.
      2) Factory-fabricated, bolted, companion-flange assembly.
      3) Pressure Rating: 125 psig minimum at 180 deg F.
      4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

3. Dielectric-Flange Insulating Kits:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Advance Products & Systems, Inc.
      2) Calpico, Inc.
      3) Central Plastics Company.
   b. Description:
      1) Nonconducting materials for field assembly of companion flanges.
      2) Pressure Rating: 150 psig.
      3) Gasket: Neoprene or phenolic.
      4) Bolt Sleeves: Phenolic or polyethylene.
      5) Washers: Phenolic with steel backing washers.

4. Dielectric Nipples:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Elster Perfection Corporation.
2) Grinnell G-Fire by Johnson Controls Company.
3) Josam Company.
4) Matco-Norca.
5) Precision Plumbing Products.

b. Description:
1) Standard: IAPMO PS 66.
2) Electroplated steel nipple.
3) Pressure Rating: 300 psig at 225 deg F.
4) End Connections: Male threaded or grooved.
5) Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.

1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.

2. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping to permit valve servicing.

F. Install piping at indicated slopes.

G. Install piping free of sags and bends.

H. Install fittings for changes in direction and branch connections.

I. Install piping to allow application of insulation.

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.

1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.

2. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back-to-back or side by side with common drain pipe.

a. Straight tees, elbows, and crosses may be used on vent lines.

3. Do not change direction of flow more than 90 degrees.

4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
   a. Reducing size of waste piping in direction of flow is prohibited.

K. Lay buried building waste piping beginning at low point of each system.

1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.

2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.

3. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Waste: 2 percent downward in direction of flow for piping NPS 6 and smaller.

2. Horizontal Sanitary Waste Piping: 2 percent downward in direction of flow for piping NPS 6 and smaller.

3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

N. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

O. Install aboveground PVC piping according to ASTM D 2665.

P. Install underground PVC piping according to ASTM D 2321.

Q. Install pressure waste piping without dips or traps insofar as passible.

R. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping.
   a. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
   a. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

3. Install drains in sanitary waste gravity-flow piping.
   a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

T. Install sleeves for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs.

1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors.

1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

W. Use of plastic piping in plenum spaces used for air movement for supply or return shall not be permitted under any circumstance.

3.3 JOINT CONSTRUCTION

A. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

B. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
    a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
    b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
    c. Do not use pipe sections that have cracked or open welds.

D. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.

E. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 appendixes.

3.4 SPECIALTY PIPE FITTING INSTALLATION

A. Transition Couplings:

1. Install transition couplings at joints of piping with small differences in ODs.
2. In Waste Drainage Piping: Shielded, non-pressure transition couplings.
3. In Aboveground Force Main Piping: Fitting-type transition couplings.

4. In Underground Force Main Piping:
    a. NPS 1-1/2 and Smaller: Fitting-type transition couplings.
    b. NPS 2 and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples or unions.
3. Dielectric Fittings for NPS 2-1/2 to NPS 4: Use dielectric flanges or nipples.
4. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.5 VALVE INSTALLATION

A. Comply with requirements in Section 220523 General Duty Valves for Plumbing Piping" for general-duty valve installation requirements.

B. Shutoff Valves:

1. Install shutoff valve on each sewage or sump pump discharge.
2. Install gate or full-port ball valve for piping NPS 2 and smaller.
3. Install gate valve for piping NPS 2-1/2 and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. Use normally closed type unless otherwise indicated.
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
2. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
3. Vertical Piping: MSS Type 8 or Type 42, clamps.
4. Install individual, straight, horizontal piping runs:
    a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.
    b. Longer Than 100 Feet: MSS Type 43, adjustable roller hangers.
    c. Longer Than 100 Feet if Indicated: MSS Type 49, spring cushion rolls.
5. Multiple, Straight, Horizontal Piping Runs 100 Feet or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.

6. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Install hangers for cast-iron soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

D. Support horizontal piping and tubing within 12 inches of each fitting**,** valve, and coupling.

E. Support vertical piping and tubing at base and at each floor.

F. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch minimum rods.

G. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.
2. NPS 3: 60 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.
5. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

H. Install supports for vertical cast-iron soil piping every 15 feet.

I. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3: 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.

J. Install supports for vertical PVC piping every 48 inches.

K. Support horizontal piping and tubing within 12 inches of each fitting and coupling.

L. Support piping and tubing not listed above according to MSS SP-58 and manufacturer's written instructions.

3.7 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.

C. Connect waste and vent piping to the following:

1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.

3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.

4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.

5. Install horizontal backwater valves in pit with pit cover flush with floor.

6. Comply with requirements for backwater valves, cleanouts and drains specified in Section 221319 "Sanitary Waste Piping Specialties."

7. Equipment: Connect waste piping as indicated.
   a. Provide shutoff valve if indicated and union for each connection.
   b. Use flanges instead of unions for connections NPS 2-1/2 and larger.

D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.

2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections according to the following unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. 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.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.

2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
   a. Expose work that was covered or concealed before it was tested.

3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.
   a. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water.
   b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
   c. Inspect joints for leaks.

4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.
   a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg.
   b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
   c. Air pressure must remain constant without introducing additional air throughout period of inspection.
   d. Inspect plumbing fixture connections for gas and water leaks.

5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

6. Prepare reports for tests and required corrective action.

E. Test waste pressure piping according to manufacturer's recommendations and as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.
   a. Expose work that was covered or concealed before it was tested.

2. Cap and subject piping to static-water pressure of 25 psig above operating pressure, without exceeding pressure rating of piping system materials.
   a. Isolate test source and allow to stand for four hours.
   b. Leaks and loss in test pressure constitute defects that must be repaired.

3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.

4. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

E. Repair damage to adjacent materials caused by waste and vent piping installation.

3.11 PIPING SCHEDULE

A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.

B. Aboveground, soil and waste piping NPS 4 and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

C. Aboveground, indirect waste piping NPS 4 and smaller shall be any of the following:

1. Copper Type DWV tube, copper drainage fittings, and soldered joints.
2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
3. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

D. Aboveground, vent piping NPS 4 and smaller shall be any of the following:

1. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; CISPI hubless-piping couplings; and coupled joints.
3. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

E. Aboveground, pumped waste pressure piping NPS 4 and smaller shall be any of the following:

1. Solid-wall PVC pressure pipe, PVC socket fittings, and solvent-cemented joints.
2. Dissimilar Pipe-Material Couplings: Shielded, pressure transition couplings.

F. Underground, soil, waste, and vent piping NPS 4 and smaller shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy duty hubless-piping couplings; and coupled joints.
3. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

G. Underground, soil and waste piping NPS 5 and larger shall be any of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.
2. Hubless, cast-iron soil pipe and fittings; heavy duty hubless-piping couplings; coupled joints.
3. Solid-wall PVC pipe; PVC socket fittings; and solvent-cemented joints.
4. Dissimilar Pipe-Material Couplings: Shielded, nonpressure transition couplings.

H. Underground, pumped waste pressure piping NPS 4 and smaller shall be any of the following:

1. Solid-wall PVC pressure pipe, PVC socket fittings, and solvent-cemented joints.

2. Dissimilar Pipe-Material Couplings: Shielded, pressure transition couplings.

I. Sanitary sewer piping and connection to exterior sanitary service piping shall be service weight ductile iron with compression gaskets or PVC with push on type Bell- end grooved joints to receive a synthetic rubber gasket.

END OF SECTION 221316

SECTION 221319 SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Miscellaneous sanitary drainage piping specialties.

B. Related Requirements:

1. Section 221323 "Sanitary Waste Interceptors" for metal, concrete and engineered polymer interceptors outside the building, grease interceptors, grease-removal devices, oil interceptors, and solids interceptors.
2. Section 221423 "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Show fabrication and installation details for frost-resistant vent terminals.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data: For sanitary waste piping specialties to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTIONS

A. Sanitary waste piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic sanitary waste piping specialty components.

2.2 CLEANOUTS

A. Cast-Iron Exposed Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. MIFAB, Inc.
   c. Smith, Jay R. Mfg. Co.
   d. Tyler Pipe.
   e. Watts Drainage Products.

f. Zurn Plumbing Products Group

2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.

3. Size: Same as connected drainage piping

4. Body Material: Hubless cast-iron soil pipe, test tee as required to match connected piping.

5. Closure: Countersunk or raised-head, brass or plastic plug.

B. Cast-Iron Exposed Floor Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. MIFAB, Inc.
   c. Smith, Jay R. Mfg. Co.
   d. Tyler Pipe.
   e. Watts Drainage Products.
   f. Zurn Plumbing Products Group

2. Standard: ASME A112.36.2M. Include wall access.

3. Size: Same as connected branch.

4. Type: Threaded, adjustable housing.

5. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.

6. Closure Plug:
   a. Brass.
   b. Countersunk or raised head per application.
   c. Drilled and threaded for cover attachment screw.
   d. Size: Same as or not more than one size smaller than cleanout size.

7. Clamping Device: Where required by application.

8. Outlet Connection: Spigot or Threaded.

9. Closure: Brass plug with tapered threads or Plastic plug.

10. Adjustable Housing Material: Cast iron with threads.

11. Frame and Cover Material and Finish: Nickel-bronze, copper alloy.

12. Frame and Cover Shape: Round except Square in tiled floors.

13. Top Loading Classification: Medium Duty.

14. Riser: ASTM A 74, Service class, cast-iron drainage pipe fitting and riser to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. MIFAB, Inc.
   c. Smith, Jay R. Mfg. Co.
   d. Tyler Pipe.
   e. Watts Drainage Products.
   f. Zurn Plumbing Products Group

2. Standard: ASME A112.36.2M. Include wall access.

3. Size: Same as connected drainage piping.

4. Body: Hub-and-spigot, cast-iron soil pipe T-branch or Hubless, cast-iron soil pipe test tee as required to match connected piping.

5. Closure Plug:
   a. Brass or plastic.
   b. Countersunk or raised head.
   c. Drilled and threaded for cover attachment screw.
   d. Size: Same as or not more than one size smaller than cleanout size.

6. Wall Access: Round, deep, chrome-plated bronze or flat chrome-plated brass or stainless-steel cover plate with screw.

2.3 AIR-ADMITTANCE VALVES

A. Fixture Air-Admittance Valves:

1. Standard: ASSE 1051, Type A for single fixture or Type B for branch piping.

2. Housing: Plastic.

3. Operation: Mechanical sealing diaphragm.

4. Size: Same as connected fixture or branch vent piping.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564 rubber gaskets.

2. Size: Same as connected waste piping with increaser fitting of size indicated or required by application.

B. Air-Gap Fittings:

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.

2. Body: Bronze or cast iron.

3. Inlet: Opening in top of body.

4. Outlet: Larger than inlet.

5. Size: Same as connected waste piping and with inlet large enough for associated indirect waste piping.

C. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.

2. Size: As required for close fit to riser or stack piping.

D. Stack Flashing Fittings:

1. Description: Cast-iron fitting, with bottom recess for terminating roof membrane, and with threaded or hub top for extending vent pipe.
2. Size: Same as connected stack vent or vent stack.

E. Vent Caps:

1. Description: Cast-iron body with threaded or hub inlet and vandal-proof design. Include vented hood and setscrews to secure to vent pipe.
2. Size: Same as connected stack vent or vent stack.

F. Frost-Resistant Vent Terminals:

1. Description: Manufactured or shop-fabricated assembly constructed of copper, lead-coated copper, or galvanized steel.
2. Design: To provide 1-inch enclosed air space between outside of pipe and inside of flashing collar extension, with counterflashing.

G. Expansion Joints – Metallic Piping:

1. Metraflex or acceptable.
2. Standard: ASME A112.6.4.
3. Body: Cast iron with bronze sleeve, packing, and gland.
4. End Connections: Matching connected piping.
5. Size: Same as connected soil, waste, or vent piping.

H. Expansion Joints – Non-Metallic Piping:

1. Manufacturer – Spears, Carlon, Flexicraft or acceptable equal.
2. Body: Fabricated piston type schedule 40 PVC with EPDM O-rings, 100 PSIG rating. Minimum 6” travel or as required by application.
3. End Connections: Matching connected piping.
4. Size: Same as connected soil, waste, or vent piping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:

1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
2. Locate at each change in direction of piping greater than 45 degrees.
3. Locate at minimum intervals of 50 feet for piping NPS 4 and smaller and 100 feet for larger piping.
4. Locate at base of each vertical soil and waste stack.

B. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

C. Assemble open drain fittings and install with top of hub 2 inches above floor.

D. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

E. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

F. Maintain air gaps on indirect waste terminations at floor drains or sanitary floor sinks. Terminate drain at floor drain funnel or at sanitary floor sink partial or omitted grate to provide splashing.

G. Install fixture air-admittance valves on fixture drain piping.

H. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof. Comply with requirements in Section 076200, Sheet Metal Flashing and Trim.

I. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:
   a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.
   b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.
   c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

J. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

K. Maintain air gaps on indirect waste terminations at floor drains or sanitary floor sinks. Terminate drain at floor drain funnel or at sanitary floor sink partial or omitted grate to provide splashing.

L. Install sleeve and sleeve seals with each riser and stack passing through floors with waterproof membrane.

M. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.

N. Install wood-blocking reinforcement for wall-mounting-type specialties.

O. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

3.2 PIPING CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

3.3 INSTALLATION OF EXPANSION JOINTS

A. Install expansion joints where indicated or required due to anticipated vertical contraction of wood frame buildings over 3 floors in height. Provide expansion joints installed at midpoint of each stack with couplings at the base and top of the stack. Installation shall be in accordance with manufacturer’s and/or structural engineer’s recommendations. Support to maintain longitudinal alignment.

B. Install expansion joints where indicated or required in accordance with manufacturer recommendations where metallic piping is subject to expansion or contraction due the temperature changes and where expansion loops or offsets are not practical.

C. Expansion joints shall be installed and supported to maintain longitudinal alignment.

3.4 LABELING AND IDENTIFYING

A. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit.

1. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.5 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221319

SECTION 221323 SANITARY WASTE INTERCEPTORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interceptors, grease.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of sanitary waste interceptor.

B. Shop Drawings: For each type and size of precast-concrete sanitary waste interceptor.

1. Materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Piping connections. Include size, location, and elevation of each.

2. Interface with underground structures and utility services.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For sanitary waste interceptors to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 INTERCEPTORS, GREASE

A. Interceptors, Grease – Composite

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Schier

2. Compliance
   a. Interceptor to be compliant with Standard PDI 101 Compliant with PDI Seal:

3. Description: Factory-fabricated grease interceptor for intercepting and retaining FOG from food-preparation wastewater.

4. Seamless, rotationally-molded polyethylene. Interceptor shall be furnished for above or below grade installation. Interceptor shall be certified to ASME A112.14.3 (Type D) and CSA B481.1.
   a. Provide with adjustable cover adapters, Safety Star® access restrictor built into each cover adapter, built-in flow control (for sizes available) and three outlet options. Inlet, Outlet, and Vent Piping Connections: Hub, or no-hub (hubless) unless otherwise indicated.

5. Interceptor flow rate and grease capacity shall be as scheduled.

6. Provide with Cover with water/ gas-tight seal, with a minimum 16,000 lbs. load capacity.

7. Interceptor shall be furnished with manufacturer's riser system to enable access for below grade installation.

8. Capacities and Characteristics:
   a. Capacities and Characteristics shall be as scheduled on the drawings.

PART 3 - EXECUTION

3.1 INSTALLATION OF SANITARY WASTE INTERCEPTORS

A. Equipment Mounting:

1. Install grease interceptors in accordance with manufacturer requirements.

B. Set interceptors level and plumb.

C. Set tops of manway cover or grates flush with finished surface or grade.

D. Set composite interceptors level and plumb.

E. Install grease interceptors, including trapping, venting, and flow-control fitting, in accordance with authorities having jurisdiction and with clear space for servicing.

1. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

3.2 PIPING CONNECTIONS

A. Piping installation requirements are specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Make piping connections between interceptors and piping systems.

3.3 IDENTIFICATION

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Grease interceptors.

3.4 PROTECTION

A. Protect waste interceptors from damage during construction period.

B. Repair damage to adjacent materials caused by sanitary waste interceptor installation.

END OF SECTION 221323

SECTION 223400 FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Commercial, gas-fired, high-efficiency, storage, domestic-water heaters.
2. Domestic-water heater accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated.

B. Shop Drawings:

1. Wiring Diagrams: For power, signal, and control wiring.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Equipment room drawing or BIM model, drawn to scale and coordinated with all building trades.

B. Product certificates: For each type of domestic-water heater.

C. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

D. Source quality-control reports.

E. Field quality-control reports.

F. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1.5 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate location with other adjacent equipment. Provide for proper access for service and maintenance.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.1.

C. ASME Compliance:

1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61 Annex G, "Drinking Water System Components - Health Effects."

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Warranty Periods: From date of Substantial Completion.
   a. Commercial, Gas-Fired, Storage, Domestic-Water Heaters:
      1) Storage Tank: Three.
      2) Controls and Other Components: One year(s).
   b. Expansion Tanks: Five years.

PART 2 - PRODUCTS

2.1 COMMERCIAL, GAS-FIRED, STORAGE, DOMESTIC-WATER HEATERS

A. Commercial, Atmospheric, Gas-Fired, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Bradford White Corporation.
   b. Rheem Manufacturing Company.
   c. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
   d. State Industries.

2. Standard: ANSI Z21.10.3/CSA 4.3.

3. Storage-Tank Construction: ASME-code steel with 150-psig working-pressure rating.
   a. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
      1) NPS 2 (DN 50) and Smaller: Threaded ends in accordance with ASME B1.20.1.
      2) NPS 2-1/2 (DN 65) and Larger: Flanged ends in accordance with ASME B16.5 for steel and stainless-steel flanges and in accordance with ASME B16.24 for copper and copper-alloy flanges.
   b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
   c. Lining: Glass complying with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.

4. Factory-Installed Storage-Tank Appurtenances:
   a. Anode Rod: Replaceable magnesium.
   b. Dip Tube: Required 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. Burner: For use with atmospheric, gas-fired, domestic-water heaters and natural-gas fuel.
g. Ignition: ANSI Z21.20/CSA C22.2 No. 199, electric, automatic, gas-ignition system.
h. Temperature Control: Adjustable thermostat.
i. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
j. 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 working-pressure rating of domestic-water heater. Select one relief valve with sensing element that extends into storage tank.

5. Special Requirements: NSF 5 construction.

6. Draft Hood: Draft diverter, complying with ANSI Z21.12.

7. Automatic Damper: ANSI Z21.66/CSA 6.14-M, electrically operated, automatic-vent-damper device with size matching draft hood.

8. Capacity and Characteristics:
a. As indicated on drawings.

B. Commercial, Gas-Fired, High Efficiency, Storage, Domestic-Water Heaters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. AERCO International, Inc.
b. American Water Heater.
c. Rheem Manufacturing Company.
d. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
e. State Industries.

2. Standard: ANSI Z21.10.3/CSA 4.3.

3. Description: Manufacturer's proprietary design to provide at least 95 percent combustion efficiency at optimum operating conditions.

4. Storage-Tank Construction: Steel ASME-code 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 (DN 50) and Smaller: Threaded ends in accordance with ASME B1.20.1.
2) NPS 2-1/2 (DN 65) and Larger: Flanged ends in accordance with ASME B16.5 for steel and stainless-steel flanges and in accordance with ASME B16.24 for copper and copper-alloy flanges.
b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Lining: Glass complying with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.

5. Factory-Installed Storage-Tank Appurtenances:
    a. Anode Rod: Replaceable magnesium.
    b. Dip Tube: Required 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. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for gas-fired, high-efficiency, domestic-water heaters and natural-gas fuel.
    g. Temperature Control: Adjustable thermostat.
    h. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
    i. Combination Temperature-and-Pressure Relief Valves: ANSI Z21.22/CSA 4.4-M. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
    j. Condensate neutralization kit.

C. Capacity and Characteristics:

1. As indicated on drawings.

2.2 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Amtrol Inc.
    b. Watts
    c. Bell and Gossett
    d. Wessels
    e. Taco, Inc.
2. Description: Steel ASME, pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:
    a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
    b. Interior Finish: Comply with NSF 61 and NSF 372 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
    c. Air-Charging Valve: Factory installed.
4. Capacity and Characteristics:
    a. Size, capacity and arrangement as indicated on drawings.
    b. Air Precharge: Pressure: as required by system.

B. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1.

D. Heat-Trap Fittings: ASHRAE 90.2.

E. Manifold Kits: Domestic-water heater manufacturer's factory-fabricated inlet and outlet piping for field installation, for multiple domestic-water heater installation. Include ball or butterfly type shutoff valves to isolate each domestic-water heater and calibrated memory-stop balancing valves to provide balanced flow through each domestic-water heater.

F. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

G. Gas Pressure Regulators: ANSI Z21.18/CSA 6.3, appliance type. Include 2-psig pressure rating as required to match gas supply.

H. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.

I. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

J. Pressure Relief Valves: Include pressure setting less than domestic-water heater working-pressure rating.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.

K. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4-M.

L. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Provide dimension that will support bottom of domestic-water heater minimum of 18 inches above the floor.

M. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater.

2.3 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect assembled domestic-water heaters specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.

B. Hydrostatically test domestic-water heaters to minimum of one and one-half times pressure rating before shipment.

C. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Commercial, Domestic-Water Heater Mounting: Install commercial domestic-water heaters on concrete base or as indicated on drawings. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete”.

1. Exception: Omit concrete bases for commercial domestic-water heaters if installation on stand, bracket, suspended platform, or directly on floor is indicated.
2. Maintain manufacturer's recommended clearances.
3. Arrange units so controls and devices that require servicing are accessible.
4. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
5. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
6. Install anchor bolts to elevations required for proper attachment to supported equipment.
7. Anchor domestic-water heaters to substrate.

B. Install domestic-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.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 “General-Duty Valves for Plumbing Piping."

C. Install gas-fired, domestic-water heaters according to NFPA 54.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.
4. Comply with requirements for gas shutoff valves, gas pressure regulators, and automatic gas valves specified in Section 221114 "Facility Natural-Gas Piping."

D. 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.

E. Install combination temperature-and-pressure relief valves in water piping for domestic-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 6” air gap onto closest floor drain.

F. 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 domestic-water

heaters that do not have tank drains. Comply with requirements for hose-end drain valves specified in Section 221119 "Domestic Water Piping Specialties."

G. Install thermometer on outlet piping of domestic-water heaters. Comply with requirements for thermometers specified in Section 220519 "Meters and Gages for Plumbing Piping."

H. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.

I. Install vacuum relief valve on each bottom fed storage water heater, installed above the top of the water heater on cold water inlet piping.

J. Fill domestic-water heaters with water.

K. Charge domestic-water compression tanks with air.

L. Install dielectric fittings in all locations where piping of dissimilar metals is to be joined. The wetted surface of the dielectric fitting contacted by potable water shall contain less than 0.25 percent of lead by weight.

M. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.2 PIPE CONNECTIONS

A. Comply with requirements for domestic-water piping specified in Section 221116 "Domestic Water Piping."

B. Comply with requirements for gas piping specified in Section 221114 "Facility Natural-Gas Piping."

C. Drawings indicate general arrangement of piping, fittings, and specialties.

D. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

E. Water heater vents shall be matched to equipment type specified. Provide UL Listed assemblies where required by code. Furnish with all accessory items including, flashing, roof cap, concentric vent/combustion air terminal, storm collar, couplings and fittings, condensate drains and mounting hardware.

F. Provide venting sized and installed in accordance with manufacturer recommendation. Install concentric flue/combustion air roof terminal per manufacturer’s written instructions.

1. Refer to mechanical specification for water heater vents.

3.3 IDENTIFICATION

A. Identify system components. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
5. Draft: Perform operational tests to demonstrate proper draft, air/fuel mixture and that venting and combustion air systems are functioning in accordance with manufacturer recommendations.

B. Domestic-water heaters will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain gas-fired storage domestic-water heaters.

END OF SECTION 223400

SECTION 224000 PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes plumbing fixtures and related components.

B. Related Sections include the following:

1. Division 22 Section "Domestic Water Piping Specialties" for specialty fixtures not in this Section.

1.3 DEFINITIONS

A. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.

B. Fitting: Device that controls flow of water into or out of plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

1.4 ACTION SUBMITTALS

A. Product Data: Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow-control rates for each type of fixture indicated.

B. Shop Drawings: Diagrams, power, signal, and control wiring and differentiate between manufacturer-installed and field-installed wiring.

1. Plans, elevations, sections, and mounting and/or attachment details.
2. Details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Diagrams for power, signal, and control wiring.

C. Maintenance Data: For plumbing fixtures to include in maintenance manuals specified in Division 1.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Counter cutout templates for mounting of counter-mounted lavatories and/or counter-mounted sinks.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For all fixture components and accessories included in operation and maintenance manuals.

1.7 REGULATORY AND PERFORMANCE REQUIREMENTS

A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.

1. Exception: If fixtures, faucets, or other components are not available from a single manufacturer, obtain similar products from other manufacturers specified for that category.

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 requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" and Public Law 101-336, "Americans with Disabilities Act"; about plumbing fixtures for people with disabilities.

D. Comply with requirements in U.S. Architectural & Transportation Barriers Compliance Board's "Uniform Federal Accessibility Standards (UFAS), 1985-494-187" about plumbing fixtures for people with disabilities.

E. Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.

F. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

G. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

H. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Hand Sinks: NSF 2 construction.
2. Vitreous-China Fixtures: ASME A112.19.2M.
3. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
4. Water-Closet, Flushometer Tank Trim: ASSE 1037.
5. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.

I. Comply with the following applicable standards and other requirements specified for faucets, fittings and valves:

1. Faucets: ASME A112.18.1M.
2. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
3. NSF Potable-Water Materials: NSF 61.
4. Pipe Threads: ASME B1.20.1.
5. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
6. Supply Fittings: ASME A112.18.1.
7. Brass Waste Fittings: ASME A112.18.2.
8. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.

9. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.

10. Hand-Held Showers: ASSE 1014.

J. Lavatory faucets, sink faucets, shower valves, and wash fountain spray heads and faucets intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ), and with NSF 61 and NSF 372, or be certified in compliance with NSF 61 and NSF 372 by an ANSI-accredited third-party certification body, in that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

K. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Off-floor fixture supports: ASME A112.6.1M

2. Plastic toilet seats: ANSI Z124.5

3. Supply and drain protective shielding guards: ICC A 117.1.

4. Disposers: ASSE 1008 and UL 430.

5. Dishwasher Air-Gap Fittings: ASSE 1021.

1.8 COORDINATION

A. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

PART 2 - PRODUCTS

2.1 FIXTURES AND ACCESSORIES

A. Refer to the plumbing fixture schedule for plumbing fixtures and accessories. Include all fittings and accessories as required for a complete working system.

B. Floor or equipment drain grates receiving indirect waste shall be fitted with a funnel. If not otherwise shown on drawings, sanitary floor sinks receiving indirect waste shall have a partial grate or the grate shall be omitted where indicated.

C. At contractor option, flexible stainless steel braided hose, 125 PSIG rated, with non-toxic liner and compression fittings may be used in lieu of chrome plated brass riser tube.

2.2 MANUFACTURERS

A. Fixtures, equipment and accessories are specified by manufacturer's numbers as to the type and quality required. Specified manufacturers and approved equal manufacturers are as follows:

FIXTURE, ITEM OR EQUIPMENT	APPROVED EQUAL MANUFACTURER
Vitreous China Fixtures	American Standard, Toto, Kohler, Zurn
Stainless Steel Sinks	Elkay, Just, Kohler, Advance Tabco
Service Sinks – Terrazzo	Stern-Williams, Acorn, Fiat, Florestone

Water Fountains and Coolers	Elkay, Halsey-Taylor, Haws
Supply Faucets & Trim	Chicago Faucets, Delta, Elkay, Kohler, Sloan, T & S Brass, Toto, Watts, Zurn
Stops & Supplies	BrassCraft, McGuire, ProFlo, Watts, Jones Stephens
Waste Fittings	Dearborn Brass, McGuire, ProFlo, Jones Stephens, Watts
ADA Under Lavatory Pipe Covers	Trubro, ProFlo, Plumberex
Water Closet Seats	Church, Bemis, Beneke, Centoco, Olsonite, Toto
Flush Valves	Sloan, Zurn, Toto
Carriers	J R Smith, Josam, Wade, Watts, Zurn
Drains and Drainage Products	J R Smith, Wade, Watts, Zurn, Josam, Sioux Chief
Valve and Waste Boxes	Sioux Chief, IPS Corp, Oatey
Water Shock Arrestors	Amtrol, J R Smith, Precision Plumbing Products, Sioux Chief, Watts, Zurn
Hydrants	Woodford, J R Smith, Josam, Zurn, Prier Brass
Mixing Valves, point of use	Leonard, Acorn, Delta, Wilkins, Watts, Zurn
Shower Bases - Terrazzo	Stern-Williams, Acorn, Fiat
Shower Bases, Tubs – Composite	Best Bath, Aquabath, Aquatic Bath, Aquarius, Fiat, Florestone, Swanstone, Sterling, Kohler
Shower, Tub Enclosures - Composite	Aquabath, Aquarius, Aquatic Bath, Best Bath, Florestone, Sterling, Kohler
Shower and Bath Trim	Symmons, Delta, Kohler

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in for water soil and for waste piping systems and supports to verify actual locations and sizes of piping connections and that locations and types of supports match those indicated, before plumbing fixture installation. Use manufacturer's roughing-in data if roughing-in data are not indicated.

B. Examine walls, floors, and cabinets for suitable conditions where fixtures are to be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FIXTURE INSTALLATION

A. Assemble fixtures, trim, fittings, and other components according to manufacturers' written instructions.

B. For wall-hanging fixtures, install off-floor supports affixed to building substrate.

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.

C. Install back-outlet, wall-hanging fixtures onto waste fitting seals and attach to supports.

D. Install wall-hanging fixtures with tubular waste piping attached to supports.

E. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

F. 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.

1. Exception: Use ball valve if stops are not specified with fixture. Refer to Division 22 Section "General Duty Valves for Plumbing Piping" for general-duty valves.

G. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

H. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

I. Install toilet seats on water closets.

J. Install flushometer-valve or lever-handle flushometer valves, water-supply fitting on each supply to each water closet.

K. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

L. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

M. Attach supply piping to supports or substrate within pipe spaces behind fixtures.

N. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.

O. 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.

P. Install actuators in locations that are easy for people with disabilities to reach in accordance with ADA or ADAG requirements. Install fixtures at correct heights for ADA and ADAG.

Q. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.

R. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Connect inlet hose to dishwasher and outlet hose to disposer or tailpiece connection.

S. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.

2. Exception: Omit trap on indirect wastes, unless otherwise indicated.

T. Install escutcheons at piping wall, floor and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Where not otherwise indicated, provide chrome plated finish in finish spaces. Refer to Division 22 Section "Common Work Results for Plumbing" for escutcheons.

U. Seal wall, ceiling and floor penetrations and provide escutcheons, chrome plated in finished spaces.

V. Seal joints between fixtures and walls, using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Refer to Division 7 Section "Joint Sealants" for sealant and installation requirements.

3.3 PIPING CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect water supplies from water distribution piping to fixtures.

C. Connect drain piping from fixtures to drainage piping.

D. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

E. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

F. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

G. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 INSTALLATION OF ELECTRICAL CONNECTIONS

A. Connect power wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

B. Install electrical devices furnished by manufacturer, but not factory mounted in accordance with NFPA 70 and NECA 1.

C. Ground equipment in accordance with the Section 260526 "Grounding and Bonding for Electrical Systems." And the National Electrical Code.

1. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

D. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

E. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate to be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."

2. Nameplate to be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.5 INSTALLATION OF CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260523 "Control-Voltage Electrical Power Cables."

C. Confirm that all electronically operated fixtures are functioning properly.

3.6 FIELD QUALITY CONTROL

A. Verify that installed fixtures are categories and types specified for locations where installed.

B. Check that fixtures are complete with trim, faucets, fittings, and other specified components.

C. Inspect installed fixtures for damage. Replace damaged fixtures and components.

D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

E. Install fresh batteries in sensor-operated mechanisms.

3.7 ADJUSTING

A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.

B. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.

C. Replace washers and seals of leaking and dripping faucets and stops.

D. Confirm that all electronically operated fixtures are properly adjusted and functioning properly.

3.8 CLEANING AND PROTECTION

A. After completing installation of plumbing fixtures, inspect and repair damages finishes. Replace any fixtures unable to be repaired to the satisfaction of the Architect and Owner.

B. Clean plumbing fixtures and associated faucets, valves, flushometer valves, and fittings with manufacturers' recommended cleaning methods and materials.

1. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.

2. Remove sediment and debris from drains.

C. Provide protective covering for installed fixtures and associated faucets, valves, flushometer valves, and fittings.

D. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION 224000